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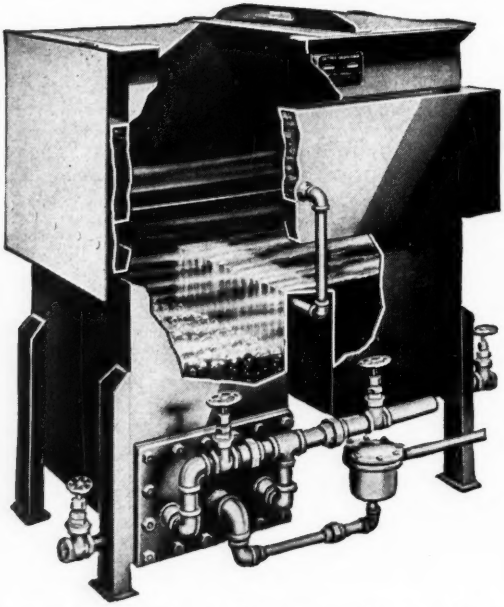

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PRODUCTS finishing

CINCINNATI, OHIO VOL. 1, No. 11

AUGUST, 1937

Pigments for the Modern Finish

BY ALLYN K. THAYER

C. K. Williams & Co., Easton, Pa.

ASIDE from clear varnishes and lacquers, finishing materials, be they paints, enamels, primers or what not, consist of a liquid portion, or vehicle, and a solid portion made up of one or several of the various white and colored pigments and fillers. It is with the materials of the solid portion that this paper is concerned.

The function of these numerous substances in paint, enamel or lacquer is to provide opacity, color or whiteness, sufficient consistency or body to enable the finishing material to be applied by brush or otherwise and to stay where applied, as well as to help provide the necessary physical attributes desired in the dried film or finish.

A rough classification would divide these solids into fillers, which in oil or an oily medium are more or less translucent, opaque white pigments, and colored pigments. It is impossible to cut sharp lines of demarcation between the various classes, for there is much overlapping, the uses of one class frequently merging into those of another; but for the purposes of such a paper this classification is sufficient.

In the first group, that of fillers, may be placed such things as barytes, silica and whiting. In the second we find white lead, zinc oxide, lithopone, titanium dioxide and others. The class of colored pigments is by far the largest and embraces numerous natural or mined products as well as a host of colors made as a result of the chemist's tireless research.

The beginnings of the use of colors are lost in the haze of antiquity. This is not strange when we consider that the earliest peoples found around them earths and ores of sundry color. So we will first consider those pigments that are found in nature ready to use with the minimum of preparation. Nature has been prodigal in her distribution of iron and it is this element that provides the essential color in so many of the natural pigments. This class may be arranged as follows:

Reds
Hematites of various character
Red ochre
Yellows
Ochres
Siennas
Browns
Umbers
Van Dyke brown
Metallic brown
Blacks
Magnetite
Graphite

The generic name of all of these is "earth colors" but as some of them are simulated artificially and really improve on the natural ones, the term "mineral, earth and oxide colors" is used to designate the whole list of present-day pigments of this general character.

Reds

All iron ores are colored but not all of them have pigment value. Some are of unpleasing color and some are so refractory and low in strength as to be valueless to the paint maker. Certain ores of the Lake Superior region are useful and in various other parts of the country are found deposits of hematite of good color. But ores of more brilliant hue are found in Spain, which until the present troubles, shipped large quantities of what the trade knows as "Spanish oxide." Then the product obtained from Ormuz Island in the Persian Gulf of the Indian Ocean has a unique color not matched elsewhere; it is known as "Persian Gulf oxide." The preparation of all of these types is a simple grinding in proper mills to reduce them to a fine powder suitable for the paint maker. The selection of mills is important because of the difference in behavior of the various ores; no one type of mill will grind all ores equally well.

Red ochre is a term heard but little these days; it is essentially a clay colored with iron oxide and with little real paint value.

Browns

The Island of Cyprus in the Mediterranean Sea is the source of Turkey umber. It is still called by that name although Turkey has not owned the island for a long time. Umber in its raw state is of a dull greenish-brown color but upon calcination or roasting it becomes a rich dark brown. A considerable manganese content is responsible for the brown coloration.

Van Dyke brown is obtained from natural deposits, is somewhat akin to umber but is derived largely from organic sources such as peaty matter mixed with more or less earthy matter. It is not used in large quantities today, although it possesses a translucency which has value in certain applications.

Metallic browns, of a rich reddish-brown color are made from various hematites, limonites and siderites, all ores of iron, which have been calcined and processed to a form suitable for use in the manufacture of finishing materials.

Yellows

Ochres are widespread in occurrence; many deposits are known and worked in the United States, the best known being in Pennsylvania, Virginia and Georgia.

The ochres from France are much superior in strength and color to those found in this country and large quantites are exported. However, the consumption of French ochres is dwindling for reasons to be explained later.

Africa and India furnish ochres of such superior character that they are frequently called yellow oxides. The coloring principle of all ochres is hydrated iron oxide.

Siennas, which have their origin in Italy, are in the raw state a rather dull yellow, but when calcined become a rich brownish red. Manganese is

found in siennas, as well as hydrated iron oxide. Similar earths are mined in the United States and elsewhere but have less value than those from Italy.

Blacks

Magnetite is a black iron ore which when ground becomes a valuable black pigment. It is found in New York and Pennsylvania in workable quantities as well as in many other places in greater or less abundance.

Many types of shale or shale-like deposits produce pigments which on account of their low coloring value, should really be classed between pigments and fillers.

Graphite, a natural form of carbon, more gray than black, has a limited use in paint, largely as a rust-inhibitive pigment.

This pretty well covers the field of natural mineral pigments although it would be an endless task adequately to cover the numberless varieties and variations of these various classes and others of small use.

Synthetic Colors

When iron sulfate, commonly known as copperas, is roasted it is decomposed with the evolution of gas, and iron oxide remains. Under carefully controlled conditions of temperature, time, kiln atmosphere, and so on, the resulting iron oxide can be produced in color ranging from a very light yellowish red to a dark maroon or purple. The lighter sorts are known in the trade as light pure red oxides and the dark ones as Indian reds. This is a most important and valuable group of pigments. If the starting raw material is of high quality and sufficient care and skill are exercised in the manufacture, the colors are bright, clear and clean, of high purity, with great opacity and excellent tint hue and tinting strength.

There is another method of producing pure red iron oxides in somewhat less general use owing to patents still in force. This involves precipitation of hydrated yellow iron oxide from a solution of the sulfate and subsequent oxidation to the ferric state by heat. The colors produced by both methods are similar but some physical differences are noted by users.

When the large rotary kilns are charged with a mixture of iron sulfate and lime the latter reacts with the evolved gases on heating and an intimate mixture of ferric oxide and calcium sulfate is produced, which is known as venetian red. Considerable control is possible in this process as well. The lower grades of venetian reds are made by extending the crude as it comes from the kiln with suitable inert materials to the desired iron strength.

In the better grades of synthetic iron oxides a long series of crushing, washing, filter pressing, drying and subsequent pulverizing follows the actual burning, in order to offer the trade well prepared pigments.

Yellows

The precipitated yellow oxides of iron previously referred to are becoming more and more important and are gradually displacing natural ochres and to some extent siennas, although the latter for some purposes has qualities which man so far has failed to duplicate.

Browns

Many sorts of browns can be made by mixing in proper proportions yellow red and black but there are available true synthetic browns resulting from after treatment of the precipitated yellow oxide of iron.

Blacks

At least two methods are known and used for the manufacture of synthetic iron blacks and both produce materials superior from the standpoint of the paint maker to any of

nature's products.

Graphite, too, is made artificially, being a product of the electric furnace.

Uses of Mineral and Earth Pigments

As a class, these colors are of extreme fastness to light, heat, and even extraordinary atmospheric conditions. They are therefore most useful where the requirements are for low priced chemically inactive pigments and where extreme brilliance of hue is not necessary. Priming and undercoat paints are regularly formulated with various of these colors, more particularly the natural reds which, in addition to the qualities described, lend wanted physical properties, such as good sanding characteristics, to the finished primer. Perhaps the principal large use of the metallic browns is for railroad freight car paints. The standard pigment for the farmer's barn for ages has been Venetian red.

Further, pigments of the class under discussion are non-reactive to each other and to all active and inert white and colored materials; they can thus be used with no thought having to be given to incompatibility.

For light tints of ivory, cream, buff and pink, the earth and mineral pigments find much use. Recently great interest has been shown in the rust-inhibitive properties of synthetic black oxides of iron.

Fillers or Extenders

That group of substances known as fillers, inerts, or extenders has at times been under suspicion as being used to supplant the more expensive lead and zinc pigments to the harm of the user and to the enrichment of the paint maker. While to a certain extent this has been true in the past and to a lesser extent at present, the group severally and individually has important uses. The maker of paints and other products to be used for industrial finishing is called upon to provide materials as varied as the products to be finished, to be applied by brush, by air pressure, in the dip tank and in other ways. To accomplish this in a manner satisfactory to the manufacturer he serves, he must have an extensive knowledge of many hundreds of raw materials, each of which imparts certain qualities to his goods. The class we will now consider is not the least important of these materials, although by and large it is the group in which falls the lowest priced of the paint maker's elementary substances.

As volumes have been written on certain of these things it is impossible obviously to do more than to give a superficial treatment of the subject. The order in which we will consider these extenders is not necessarily the order of their importance or value.

Barytes

Barytes is the name given to barium sulfate of natural origin when powdered and prepared for use. While barytes or barite is found quite widely distributed throughout the world, the domestic supply is quite ample for domestic use. The two large producing states are Georgia and Missouri. The Georgia product is mostly of the hard crystalline variety, not especially suitable for use in paint. Missouri ores are soft, friable, and easily prepared. The industry in that state centers more or less in Washington county. The barytes, locally known as tiff, occurs as small lumps in beds of clay. Small pits are dug to disclose the ore, which is removed and spread out in the sun to dry, when the clay cracks and the most of it easily is removed by simple means. Most of the barytes mined is stained with impurities such as iron oxide, so that when ground, it is not a pure white. Consequently, bleaching is resorted to in order to

produce a pure white article. The bleaching is done by means of hot sulfuric acid in vats in which the barytes is suspended in water. When the impurities are dissolved the bleached barytes is washed to free it from acid, dried and disintegrated. Barytes is the heaviest of the inert pigments, having a specific gravity of 4.45.

Blanc fixe is barium sulfate chemically made; it is quite different physically from the natural barytes. Some use of it is made in finishing materials.

Whiting

Whiting is essentially calcium carbonate although some grades contain substantial amounts of magnesium carbonate. If you were to take a lump of ordinary limestone and crush and powder it you would have whiting. As limestone is found nearly everywhere it readily can be seen that whiting can be made easily and cheaply, and so it is. But as limestone, as well as chalk and marble, which are chemically the same, varies in so many ways with its source, so does the whiting. It is thus necessary to know the peculiar qualities of the whiting under consideration in order to judge of its value as a paint pigment. Whiting made from different crude rock has quite different characteristics, which are accentuated by the means employed to grind or pulverize the rock, whether dry grinding, wet grinding, and so on.

Whiting also is made artificially in a number of ways in order to control impurities, the physical state of the particles, and for other reasons. Recently much work has been done in treating the surface of calcium carbonate particles with such things as stearic or oleic acid. This treatment completely alters the nature of the whiting and transforms one of the cheapest pigments into one of much higher value and of a nature unique.

Much use is made of whiting in putty, calcimine and casein paints. The artificial calcium carbonate is used in enamels to improve brushing and leveling and in other finishing materials for other purposes.

Silica

Silica is about as widespread in nature as calcium carbonate, being the main constituent of all quartz and flint; chemically it is silicon dioxide. But the paint maker is interested, except for special uses, mostly in the soft amorphous variety, the principal source of which is southern Illinois. The value of silica, or silex as it is sometimes called, depends upon the care used in its manufacture. Certain qualities are imparted to a paint product by the use of silica which can be obtained in no other way. It is used in paste fillers to give tooth and adhesion and in paints to aid resistance to high temperatures and extreme atmospheric conditions.

Talc or Asbestine

Asbestine is a name given to a type of magnesium silicate found in northern New York, although other deposits are worked also. Its value lies chiefly in its peculiar crystalline form. Under the microscope the powdered material is seen to consist of a myriad of tiny needle-shape crystals intermeshed. Because of this, it has the ability to keep other pigments from settling into a hard mass. Chemically, talc and soapstone are the same, and, in fact, magnesium silicate from various sources is used to give certain effects that the paint maker desires in his product.

Clay

Here again, we have a product of nature that is found in many places in many qualities. The only clay of interest to the maker of product finishes is one of white or nearly white color. The whitest of all clays comes from England and is known as china

clay or kaolin; in fact, it is so white that it is used for the clearest china. This same whiteness makes it suitable for use in the whitest of paints, where it has much use. The expert paint chemist knows that nothing will take the place of kaolin when certain effects are sought.

By no means does this exhaust the list of inert pigments finding regular use, but does name the most important ones. Others are diatomaceous earth, slate, gypsum or terra alba. Another paper will cover the active white pigments, the black fume pigments, and the chemical and organic dry colors.

Effect of Wheel Speed on Polishing Performance. This publication, No. 2 of Volume 28 of "Grits and Grinds," is devoted to a discussion of the most efficient speeds at which to operate the modern high speed grinding wheels. The text comprises practically a report of the conclusions which have been arrived at after a considerable amount of research and experimentation both in the laboratories of the Norton Company and other places. A chart shows the total cost per unit of metal removed with the wheels operating at various speeds from 4500 to 9000 r.p.m. Results of tests made for machine vibration at various speeds are also included. One page comprises a table of disc wheel recommendations in which the proper wheels are suggested for a wide variety of work on materials of various kinds including aluminum, brass, bronze, carbon, cast iron, steel forgings, dies, porcelain, rails, springs, and so on.

Illustrations include views taken from the polishing departments of various industries, general view of Norton Company Research Laboratories, special equipment used in making tests, drying ovens used in the research laboratory, different types of wheels mounted for operation, and so on. Copy free by addressing Norton Company, Worcester, Massachusetts.

"Greater Lighting Efficiency", an illustrated booklet published by the General Electric Vapor Lamp Company, 893 Adams St., Hoboken, N. J., gives facts and figures about the newly improved horizontal Cooper Hewitt Lamps. In the new booklet may be found a description of both the 33-in. and the 50-in. lamps, as redesigned for better industrial lighting, particularly for precision work of all kinds. The booklet sets forth improvements of the lamps over former models, such as increased light output per watt, instantaneous starting, horizontal suspension, greater operating stability, the highly efficient reflector and the new simplified design.

In a section of Engineering Data, valuable information is given for computing the proper spacing of Cooper Hewitt lamps to obtain any given illumination level. In addition, photometric ratings for both the 275 and 350 watt lamps are given, as well as the essential dimensions and layout of lamp suspension.

"Greater Lighting Efficiency" may be obtained by writing the General Electric Vapor Lamp Company, 893 Adams St., Hoboken, N. J. Ask for Bulletin No. 520.

Chip Proof Black Flexible Lacquer Enamel; Blue Knight Blax. This is the title of a product summary which is now being issued by Roxalin Flexible Lacquer Co., Inc., Box 775, Elizabeth, N. J., in which the properties of Blue Knight Blax, a cellulose type, air drying, flexible lacquer enamel, are described. It is stated by the manufacturer that this type of finish does not chip, flake, or peel. It is said to stand blanking and forming. Available in three lustres, this finish comes ready to spray. Samples of this finish on brass, aluminum and cold rolled steel are supplied for test by scratching, bending, and so on. Copy free upon request.

High Intensity Mercury Lighting. A catalog describing many types of industrial lighting equipment for use with 200 and 400 watt high intensity mercury vapor lamps has been published by the Westinghouse Electric and Manufacturing Company. Combination mercury-incandescent units are also described. Included in the catalog is information on designing and installation, choosing mounting heights, spacing and size of units for different wall and ceiling conditions, and average resultant lighting intensity. Vapor proof units for severe service conditions are included. Copies of the catalog are available from the Lighting Division, Westinghouse Electric and Manufacturing Company, Cleveland, Ohio.

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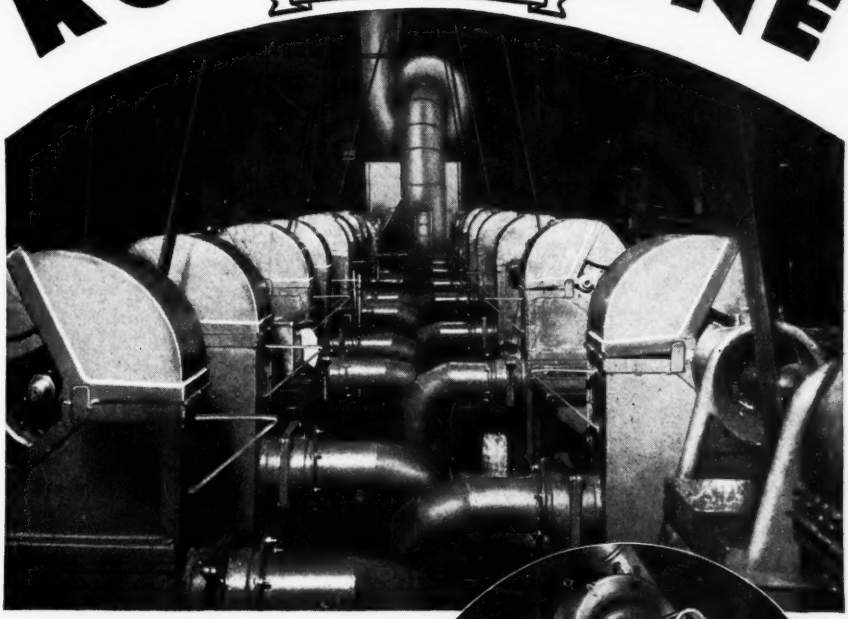

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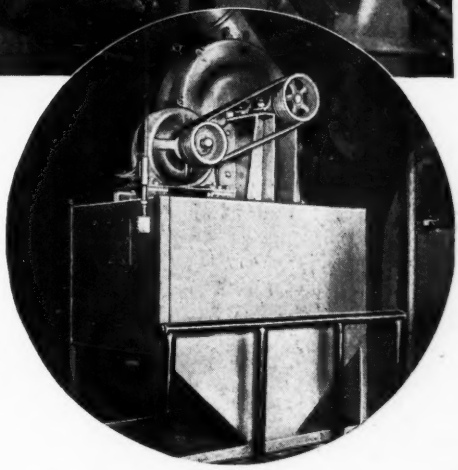

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Developments in Porcelain Enameling Practice

It is in the laboratories where men of science toil incessantly that the far reaching and significant improvements have been made in porcelain enamel finishes.

By Geo. P. MacKnight
Porcelain Enamel Institute, Chicago, Illinois.

MORE PROGRESS has been made in the adaptation and preparation of porcelain enamel finishes in the last few years than during all the centuries in which this flint-hard mineral substance has been used as a finish. Sudden changes in time honored designs of such utilitarian objects as kitchen ranges, sinks, cabinets, work tables, bathtubs, lavatories and other bathroom equipment and decorations, have given a decided impetus to the development of the uses of a porcelain enamel finish, with its superior durability. The departure into the field of colors, which has been made positively practical in porcelain enamel finishes, has also greatly broadened their application.

Added to that, the development of an improved white enamel for cast iron, which compares favorably with white sheet iron enamels in every particular, has greatly enlarged the field of usefulness for this finish.

And all the while that the field of usefulness for porcelain enamel was being extended, these same laboratories were bending their efforts toward greater efficiency and economy in the preparation and the application of the finishes. One of the outstanding triumphs was the development of new types of porcelain enamels of a highly opaque quality. Those enamels may be applied to the base metal with thinner coats. It is obvious that this effects a saving in that the same degree of coverage can be obtained with

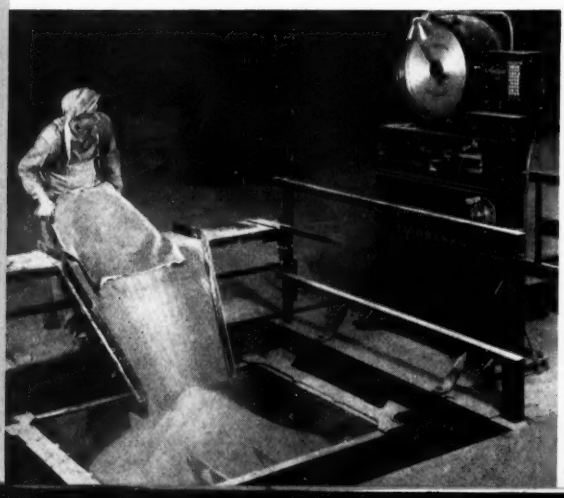

Fig. 1—This illustration shows the mixing of a "batch" of raw materials, which later will be smelted at approximately 2000 deg. F., to produce what is known to the industry as "frit".

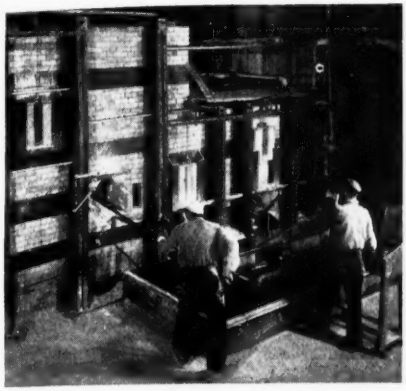

Fig. 2—Here is a view of a smelter. The raw materials, properly mixed, are placed in the smelter at the top. After the smelting cycle is completed, the molten mass flows through the trough shown at the right, into the pit below. In this picture, one man is stirring the "batch", and the other is taking an optica pyrometer reading.

much thinner coatings than with the types of enamels heretofore in use. Indeed, these thinner coatings materially reduce the risk of chipping.

Another important step forward in the preparation of porcelain enamel finishes has been the creation of "clear over-glaze" enamels which have met high favor within the last year. By their use it is possible to cling to the ordinary enameling practices and, yet, obtain an acid-resisting surface by giving a light coat of acid-resisting glaze over the finished article.

Reverting to the economies which are the result of recent laboratory research, the use of black-edge enamels has been perfected so that it can be done with a high degree of satisfaction by spraying the black enamel over the ground coat before any firing is resorted to. Within the last few months the use of this type of enamel has become so universally popular, and so widespread in use, that costs generally have been lowered because of the lack of necessity of the additional firing.

Again these same scientists have furthered economies in production of porcelain enamel finishes by developing new undercoatings, or ground coats, which permit the use of considerably lower temperatures in fusing the coat to its metal base. Thus warpage during firing largely has been eliminated; and the utilization of porcelain enamel to difficult shapes, which heretofore might have created quite a problem, has been made possible.

It is difficult to leave any discussion of the function of the laboratory in the preparation of porcelain enamel without stressing the sentry duties that are so ably performed by these scientists. There are many ingredients used in the manufacture of porcelain enamel, and the mineral substances that enter into them come from the four corners of the earth.

Fig. 3—Before the liquid porcelain enamel is applied, the metal shapes are thoroughly cleaned by "pickling" in acid tanks, such as those shown here.

Fig. 4 (Above)—The first coat of porcelain enamel is usually applied by dipping, the process illustrated in this photograph.

Fig. 5 (Right)—This shows several table tops just entering the furnace. Note the intricate designs.

For that reason they have to be bought in large quantities and held in storage until ready for use. But each batch or raw material must pass under the scrutiny of the men who peer through the microscopes, make chemical tests — as well as physical — to be assured of the high quality of the materials about to be processed.

After much careful selection, the raw materials — which are dry chemicals and minerals — are reduced to a molten state by heat as high as 2,200 degrees F. During all stages of smelting the heat is accurately controlled by delicate recording instruments.

Immediately at the conclusion of the smelting operation the molten mass is plunged into pits filled with cold water — a process called "quenching." By that means the molten material is battered into millions of tiny particles. And they are that granulated mineral substance —the "frit"—the quality of which is of ut-

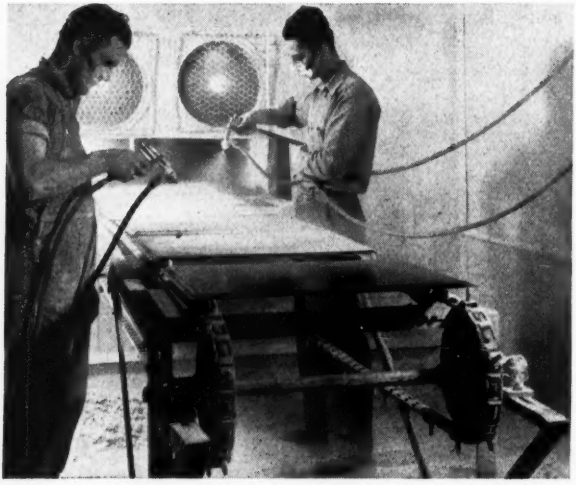

Fig. 6—After the ground coat is applied, subsequent coats are usually applied by spraying. Pictured here are workmen applying porcelain enamel to metal shapes by the spraying method.

most importance in the preparation of porcelain enamel finishes. Great care is taken in drying and classifying frit. Once more the laboratory worker steps in and subjects the finished frit to a long series of careful tests.

The frit is placed in mills in which it is finely ground. Mixed with it are clay, water, and other ingredients, including oxides when colors are used. It is milled until it is so fine that it floats in the solution of water and clay, and forms a creamy liquid for application to the base metal.

Fig. 8—Every process in the manufacture and application of porcelain enamel is controlled by absolute accuracy. These men are looking at a pyrometer which controls the temperature of the enameling furnace.

Naturally, the base metal for porcelain enamel must be of high quality and absolutely clean. The cleansing is done in two ways: steel parts are pickled in solutions of both alkaline and acid cleaners; cast iron parts are cleaned with an air driven stream of sand.

The next process is the application of the ground coat, which is made by dipping the metal part into a tank containing the liquid enamel. In case of large pieces, the enamel usually is sprayed on.

The parts then are dried, and the ground coat fired, or fused, onto its supporting metal at approximately 1,600 degrees F. of heat. The ware then is ready for its second coat,

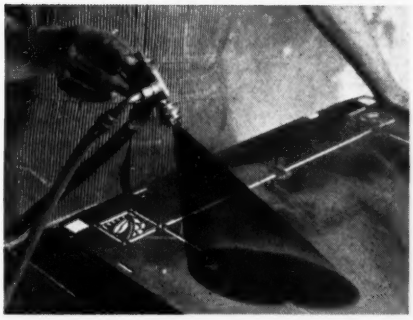

Fig. 7—Some of the intricate designs are also accomplished by spraying. Here is a workman spraying a porcelain enameled table top through a stencil so as to obtain the desired effect.

which is applied in spray booths. In virtually all cases, two finish coats, each requiring a separate firing, are applied.

It is of high importance to mention that no organic substances (vegetable matters) could exist under such temperatures as are applied to the inorganic (mineral) matter of which porcelain enamel is made, and that such

Fig. 9—This is a scene in one of the large enameling plants' laboratories, where one engineer is showing a supervisor a sample of a porcelain enameled stove leg.

heat makes the inorganic porcelain enamel an integral part of the metal itself. It is actually welded to the base metal.

Those are the reasons why porcelain enamel, fused into a flint-hard substance, neither wears nor fades. Briefly, those are the important phases of porcelain enamel production. So far as its uses are concerned, science and industry are finding new ones constantly.

But one of the newest and probably the most dramatic use which science has found for porcelain enamel is being brought about by the perfection of colored photography. The effective use of colors in making porcelain enamels now enables reproduction in full color of photographs, or works of art. Thus, it has been said, "porcelain enamel is as old as antiquity and as new as tomorrow's dawn."

In order further to protect consumers and users of porcelain enamels, one of the newest moves of the Porcelain Enamel Institute, Inc., has been the tentative standardization for various tests, and the design of metal parts. This effort at standardization has met with immediate and favorable response, and certainly should give complete assurance of minimum qualifications.

Ball Burnishing with Abbott Barrels and Materials. This is the title of an 8-page folder which is now being issued by The Abbott Ball Co., 1060 New Britain Ave., Hartford, Conn. It explains that the results in ball burnishing are secured by the pressure of steel balls rolling over the parts in a solution of soap and water. The efficiency of the process depends on the pressure. The high and narrow design of Abbott vertical barrels confines the weight of the burnishing mixture within a narrow area. This concentrates the pressure just where it is needed—directly on the parts being finished. The items listed in tabular form are barrel size, number of compartments, pecks of work per load, burnishing materials required, power needed to operate, floor space, shipping weight and so on. Copy free upon request.

Rotor Air Tools. A handsome 20-page book in color devoted to the air drills, reamers, screw drivers, nut setters, wood borers, grinders, buffers, sanders, wire brushing tools and other air operated equipment made by The Rotor Air Tool Co., Cleveland, Ohio, is now being distributed by this firm. Included are illustrations and descriptions of each of the tools mentioned, together with photographs of various jobs upon which these tools are shown at work. Copy free upon request.

The American Rolling Mill Company, Middletown, Ohio, has just issued a 26-page booklet on **"Armco Stainless Steels —Chromium Nickel Grades."** Uses of Armco stainless steels in many products are illustrated.

The booklet contains detailed information on heat treatment, drawing, punching and shearing, spinning, riveting, welding, electric and gas welding, soldering, brazing, and pickling. There are charts, too, showing the chemical and physical properties of Armco stainless steels, in addition to corrosion resistance data. Copy free upon request.

Haynes Stellite Burnishing Rollers. This four-page folder, issued by Haynes Stellite Company, Kokomo, Ind., describes and illustrates the Haynes Stellite Burnishing Roller. According to the bulletin, Haynes Stellite Burnishing Rollers are standard in many of the leading American railroad shops for burnishing locomotive driving axle journals, car axle journals, locomotive piston rods, crank pins and other parts. The particular features which make Haynes Stellite advantageous for the manufacturer of rolling tools consist in the fact that Stellite takes a very high polish, burnishes effectively, has a very low coefficient of friction and that steel will not adhere to it. The Haynes Stellite Burnishing Roller revolves on double opposed roller bearings protected by metal dust plates. Copy of the bulletin free upon request.

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Barrel Burnishing of Metal Products

Seventh Article of Series — A Composite Burnishing Analysis.

By H. Leroy Beaver

ONE OF the questions most frequently asked us as a consultant is "Just what is a barrel burnishing analysis, of what does it consist, and how do you go about making it?" So for the benefit of the many who have asked the above question or a very similar one but with the same import, let us go together through a representative manufacturing plant making our analytical comment as we go.

In most cases we are taken direct to the finishing department of the plant, led up to the burnishing barrel or barrels and more often than not, with an air of finality, our guide says in substance: "Well, there you are — now what about it?" The "what about it" is that we are being asked to make a beginning of an analysis at the finish instead of the starting line.

The first point in an analysis is to determine what parts are made and which are desired to be barrel burnished, and whether castings, stampings, forgings, and so on, and to have a sample of each part in each stage of its formation ready at hand so that it may be examined by itself and also as its composite part in the whole proposed burnishing plan.

Our first contacts naturally are with the design and engineering departments. We have often wondered why designers and draftsmen, when preparing drawings for patterns and for dies and especially for stampings insist on working in as many sharp angles as possible. On most every part where they might be found they will draw in direct right angles into which in many cases it is most difficult to burnish even when formed burnishing pieces instead of balls are used. In all such cases more successful burnishing results will be secured by softening or rounding such angles to not less than a 3/32-in. and preferably a ⅛-in. radius. This is especially true and applicable in present design practice where stream lining is the vogue. Following this course will not only provide for easier access and pressure by the metallic burnishing material, but there will also be less strain and tearing of the metal skin in forming. To soften angles means less die wear and replacement with a consequent saving in die sinking costs.

The sharper the angles are drawn in a stamping die, the softer annealed stock will be required to properly form the stamping, so that the metal does not tear or actually break in the forming process. Now in the case of strip steel stock. This may be secured in Hard Tempered, Medium Tempered, Soft or Dead Soft Annealed, or perhaps a designation of hardness as No. 1 temper, No. 2 temper or No. 3 temper. The general rule is that the harder the material is from which the

piece is formed, the better will be the barrel burnished finish. Harder materials, especially steel, will come from the burnishing barrel with a high limpid lustrous finish, while soft annealed material will have a dull gray and often lifeless appearance, because in barrel burnishing soft annealed stock is not susceptible to the high lustre and color that can be imparted to harder material. It may be safely said that if we use the Rockwell Scale for hardness determination that materials reading in "B" scale will not be as successfully finished as to color on which to subsequent a plating, as materials that would read in the "C" scale range. This suggests from us a recommendation to manufacturers to soften their die angle so that they may use a proportionately harder material adapted to such dies to secure the best possible burnished finish both as to smoothness and color on which to deposit the plate.

Another thing often requested is an outline of methods for removing burrs and drags by barrel finishing. It is really surprising to what a large extent this operation can be eliminated by proper die design or die maintenance and proper raw material selection. Dull dies and dead soft annealed stock are both conductive to burrs and drags, and in a great majority of cases we can avoid this troublesome "cutting down" or "deburring" operation simply by a die change and a change in material specification. All that has been said in respect to selection of steel strip may also be applied to strip made from other materials. In all cases of stamping and forming there is always a direct relation between the design of the dies and the character of material from which the parts are to be stamped and formed. So the reader will see that the first step in an analysis is an examination of the design of the parts; the dies for forming the parts and the character of the raw material from which they are to be formed.

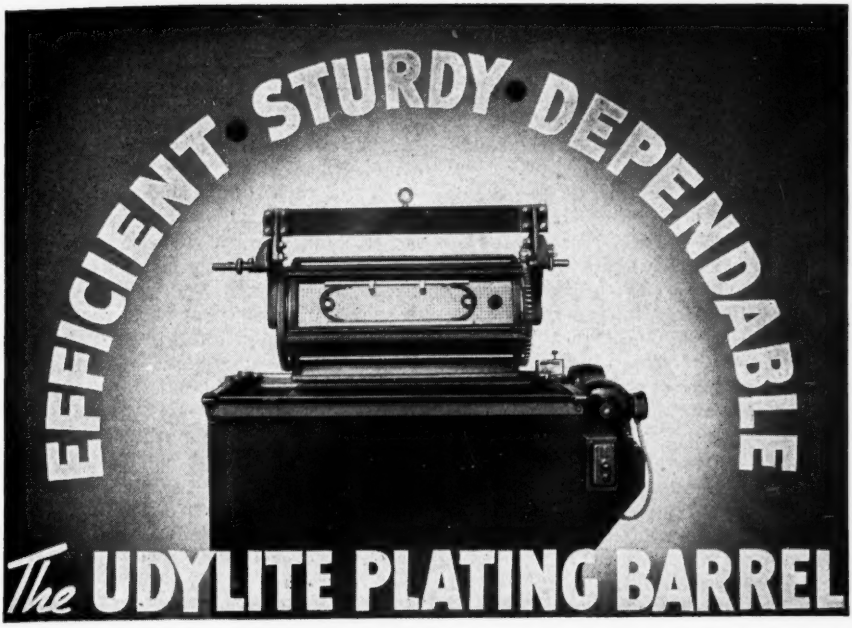
Now with respect to castings, much the same thoughts apply as to stampings, and one of the first things we examine into in a case where castings are to be barrel finished, is the type of pattern and the sand in which the mold is formed. Here sharp direct angles are to be avoided in exactly the same sense as in stampings. If castings are to be barrel finished then a very fine moulding sand is imperative so that the smoothest possible surface finish may be secured. There is no point, however, in purchasing a fine sand, such for example, as a grade known in the foundry trades as "Windsor Locks," and then after a very short time in use find coarse surfaced castings coming from the foundry. The reader would be surprised to know of the many instances we have met where fine sand was started and then after the first pour this sand was sifted through coarse sieves which permitted small particles chipped from cores, small drags and bits of metal or slag to become mixed with the casting sand thus forming rough surfaced castings. In many cases where these small particles are permitted in the sand they will weld with the molten metal forming surface imperfections that must be removed with a wheel prior to barrel finishing. If you start with a fine sand, then be sure to use an equally fine sieve. Naturally it will require a longer time to sieve the sand for subsequent use, but with the modern design of foundry riddles this is not difficult, and most certainly the extra effort exerted in this regard will surely be reflected in the finer surface finish of the castings, and will very materially reduce the operating time both in preliminary cutting down or smoothing operations and as well on the later and final barrel burnishing operation. Even under the most ideal

conditions, castings present far more problems in barrel finishing than do stampings, and this is also true of die castings where the surface imperfections are not comparable to sand castings, but die castings and methods for finishing them are not discussed in this paper but will be discussed later in a paper devoted solely to that subject.

Whether in blanking or forming, there is much room for improvement in the average factory procedure. In all too many cases we have seen blanks or forms dropped into tote pans from a height of anywhere from one and a half to three feet. Whether the blanks or forms have burrs or not, this procedure is not conducive to later satisfactory surface finish, because the scratches and digs caused by one part striking upon another when dropped from a heighth are often difficult to remove. When we consider what a simple thing is a canvas baffle that will slide the blanks or forms gently into the tote pans instead of dropping them directly from a heighth to cause damage and marring to one or more other parts that they strike, we wonder why they are not in wider use. All along the line in the process of metal forming and finishing it is the strict attention to these small details that spells the difference between fine finishes economically produced and mediocre finishes produced at even higher costs.

In later years we have met to a considerable extent with a practice by some manufacturers of purchasing blanks from which to form their stampings which are punched from "off cuts" of other manufacturers. The difficulty in this practice is in the securing of uniform material. It is not sufficient that such blanks be in one gauge of thickness only, but they should also be approximately the same degree of hardness. Where we find parts thus formed we generally can note it immediately by the variation in color of the parts as they come from the burnishing barrel after completion of the burnishing process. When such parts are plated there will also be a difference in color. The variation is not so striking when the parts are viewed of themselves but does become readily noticeable when one inspects the finished assembled product. This comment is of course not to be construed as an objection to manufacturers buying their blanks in this way, but rather as an appeal to suppliers of such blanks to use as much care as possible to see to it that in any lot of materials the hardness should be approximately the same. Where this precaution is observed there are many cases where very considerable savings in production costs may be made.

In many plants, dies are permitted to become badly worn, the thought seemingly being that even though they do produce burrs and drags, that a subsequent cutting down or deburring or abrasive tumbling operation will compensate for the inadequacy of the die operation. In every case this can easily be proven to be fallacious reasoning and in many instances a deburring operation after stamping or forming may be completely eliminated by proper die maintenance. It must not be forgotten that in any operation of deburring or cutting down, so called, that if the edges of the parts are rough enough to require this operation, that in the carrying out of the operation it is mechanically impossible to avoid scratching or marring the smooth areas of the parts which later requires far longer operating cycles of burnishing to again smooth out the plane surfaces. The less the skin of the metal is disturbed the better will be the ultimate finish of the parts. So if you can eliminate a deburring or cutting down operation by proper maintenance of the dies,



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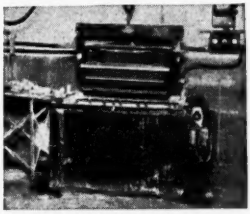

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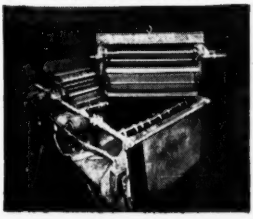

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by all means do so.

All strip steel as received is slushed with oil or grease and then again receives additional lubrication in the stamping and forming process. Now it is just as easy to specify a 100 per cent saponifiable grease or slushing oil as it would be to specify grease of any other kind, yet this is seldom done perhaps because its importance in cleaning methods is not as completely understood as it should be. In cases where we have raised this question, the answer has often been "We don't worry about this because we take off all the grease with a saw dust tumbling operation."

Saw dust tumbling so-called is well enough in its proper place but when parts covered with non-saponifiable grease or oil are so operated, it is true that the saw dust will wipe off and absorb the grease or oil to a considerable extent and the difficulty lies in taking parts direct from this saw dust tumbling operation and placing them in the burnishing barrel. In all too short a time, where this practice is followed, we find the inner surfaces of the burnishing barrels as well as the steel burnishing material coated with grease that the average mild lubricating burnishing soap solution will not dissolve and remove. As a method of removing an excess of grease or oil the saw dust tumbling operation is efficient up to a certain point, but no parts should be placed in the burnishing barrel after this operation until they have first undergone a subsequent cleaning either still tank or electrolytic. This intermediate cleaning operation should not be of the "lick and a promise" variety either, but a thorough operation, for we must always remember that **scrupulous cleanliness** must be the rule in barrel burnishing if you desire to secure satisfactory finishes.

Here we would comment on the fact that in all too many instances dipping screen baskets are too large and of too great capacity. It is well enough to suppose that one can fill a basket with parts, hang it in a tank of cleaning solution, and after a certain interval simply withdraw it and consider the parts to be cleaned. Unfortunately perhaps efficient cleaning is not so easily accomplished. In the first place may we suggest that smaller baskets can and most generally are operated at greater efficiency than larger ones. A basket for cleaning parts including the charge of parts should not weigh more than 25 pounds and if heavier than this the average operator cannot properly agitate the work. Our theory of cleaning by the basket dipping method and which we use either in still or electrolytic cleaning, is to "slosh" the basket up and down in the solution, shaking the basket load of parts so that all surfaces of the parts are exposed to the action of the cleaner, and this cannot be done efficiently with heavy baskets loaded completely full of parts. It is argued by some that in electrolytic cleaning no such agitation is necessary. While we admit that the electrolytic action of raising grease and oil bubbles from the surface of the parts is well enough, a thorough agitation of the parts is also necessary. With a basket 12 inches in diameter and 12 inches deep almost completely filled with parts it is asking a little too much to expect the current to pass through and remove all surface oil and grease without some agitation or stirring about of the parts. Recently in a Philadelphia plant burnishing trouble developed. Parts could not be brought from the barrels brightly burnished. In cleaning, about 70 pounds of parts were loaded into the basket, hung in the tank and after the proper interval the basket was lifted out given a clear water rinse and thence to the burnishing barrel. One basket we lifted out

ourself, dug down into the centre for a handful of parts and found them decidedly greasy which accounted for the coating of grease on the inner burnishing barrel surface as well as on the steel burnishing material. First we reduced the load to 25 pounds per basket and had the operator agitate the basket in the cleaner by sloshing it up and down before removal; secondly, we cleaned the barrel and burnishing material with three washings of a solution of 6 ounces of tri sodium phosphate and 6 ounces of sodium cyanide per gallon of water of 180 degrees with the result that the next lot of parts came from the barrel clean and bright.

As an analytical proposition we believe it quite apropos to comment here on another quite wide spread fallacy. A plant Superintendent said to the writer "You'll notice we have quite a lot of things to burnish but only small lots of each, so I suppose we would only need a small barrel." It is strange to what extent this idea prevails. In the case in question the parts were quite large and of more than average thickness for stampings. The 8x30 barrel he thought would be adequate was altogether unsuited for the work, but it required actual test runs to convince him that weight is an essential factor and that the size of the barrel and the weight of the burnishing mass are directly proportioned to the size and weight or thickness of the parts to be burnished, and that these ratios cannot be ignored if economical practice is to be had. Intead of an 8x30 barrel and 300 pounds of burnishing material requiring a run of 10 to 14 hours with only average finish, they now use a double 16x30 barrel with 1000 pounds of burnishing material which in 4 hours gives them excellent results and parts are run in larger quantity being selected so that they are easily separated after the burnishing operation.

The question of the relation of barrel size and load is also quite applicable in the case of grinding down castings, forgings and so on. All manufacturers of wood lined burnishing barrels generally offer the cast iron barrel shells without wood liners for grinding and cutting down work. In many cases this works out satisfactorily but in general such barrels are too small for effective grinding work. In cutting down and grinding whatever the character of the abrasive used it cannot equal the weight of metallic burnishing material and so in order to secure the proper weight concentration, proportionately larger barrels should be used for this operation. In the case of castings and forgings we have a very different proposition than when we are working with sheet metal stampings for the reason that the former are far less liable to suffer appreciable permanent distortion or deformation even though the operating loads both of burnishing material and parts are extremely heavy. An illustration of this is the case of the operation of 12 oblique tilting type barrels each carrying a load of 300 pounds of parts (forgings) that required sand and water grinding. With this weight concentration the operation requires 36 hours of continuous operation to secure the desired finish. Now with a single installation of a 60 inch barrel they operate the entire 3600 pounds at one operation and bring out the parts with a far better finish in from 16 to 18 hours.

Coming now to the plating department where, whether the parts be castings, forgings or stampings, the first operation is cleaning and this may be by acid pickle, vapor degreasing, still or electrolytic alkaline cleaner. Alkaline cleaners have the same general characteristics whether for still or electrolytic action. Cleaning is a subject that perhaps has not

been so widely discussed as has the electrodeposition of the various metals, but it is equally as important for the reason that as near as possible an absolutely clean surface is required to assure permanent adherence of the plate. We have a host of authorities in this country, many of whom regularly report the results of their research work in the form of papers in various trade publications, and for the most part, platers are conversant with the new trends in metal cleaning. It is not cleaning in its broader aspects and applications in which we are interested but particularly cleaning preparatory to barrel burnishing. We hold no brief for any cleaner or system of cleaning, but we do insist that parts to be barrel burnished must rinse free and clear and show no water breaks before they are placed in the burnishing barrels.

In one survey after another we meet with two general conditions that taken either together or separately operate to defeat in a marked degree economical and practical barrel burnishing. First of these is the purchase of too small a barrel and second the use of an insufficient quantity of burnishing material to provide the proper and necessary pressure on the parts being burnished while the mass is in motion. The difference in cost between a large barrel properly loaded and a small barrel also properly loaded, that is, as to the quantity of burnishing material required, is of course, a considerable item when the comparison is made in this way, but the comparison rather should point out the difference in operating time per load and the superiority of the finish secured. We must however, not lose sight of the barrel size and weight of burnishing mass on such parts as might suffer appreciable permanent deformation, just as we have pointed out in previous papers. On parts formed, for example, from sheet of 14 gauge or lighter, even the smallest commercial sizes of barrels concentrate too great a load on such parts and in such case tubbing machines are generally used. Just because the old formula of two parts of burnishing material to one part of the parts to be burnished has been arbitrarily followed for years, it does not mean that three or four or six parts of burnishing material to one of parts to be burnished cannot be used, for, as a matter of fact, if the parts can withstand the stress of the flowing mass, the surface of the parts will be "work hardened" to a greater density and hence a higher lustre and smoother surface finish. We seldom, however, find barrels overloaded insofar as the burnishing material is concerned, but we do find many cases where the old proportion of two to one is reversed and indeed in some cases we have found as much as three parts of stampings being run with one part of balls — this, however, could never be called burnishing, but tumbling and of the crudest sort. Normally we find the average barrels to be underload anywhere from 20 to 30 per cent on burnishing material. This can be accounted for largely by the use of the old "scoop shovel" method of loading the burnishing material into the barrels. It is quite impossible to avoid spilling more or less of the material which rolls away into corners, and almost without realizing it a fair proportion of the mixture, in the hands of the average operator, is lost. If you have a barrel whose normal load is 500 pounds it most certainly will not operate efficiently with a burnishing material load of 250 or 300 pounds, yet cases as extreme as this are often met. Operating at higher than burnishing speeds you can of course, "tumble" with smaller quantites of burnishing mass, but we have yet to see what would be classed as "good" burnishing, unless the load

of burnishing material and parts to be burnished filled the barrel at least two-thirds full or well above the centre of the axis of the barrel.

Next point of importance is the determination of the water hardness. This is important because when water is hard it requires larger quantities of soap to lubricate it, and the average soap when used with hard water hydrolizes rendering it insoluble to a large degree and it deposits on the work, the burnishing material and the barrel surfaces rendering good burnishing well nigh impossible. The reader would no doubt be surprised to know the remarkably large number of cases of burnishing "trouble" that have been solved simply by checking up on the water hardness and the character of the soap used. We would also stress these two points and even though you feel that you are getting altogether satisfactory results, you may find that normalizing your water supply and checking up on your soap will effect improvements you hardly thought possible.

As to rinsing the parts after the burnishing operation. The most satisfactory burnishing soap has a "hard tallow" base. Its fatty acids crystalize at around 104 degrees F. Your rinse water should be at the lowest, slightly above that figure, if you dry in a saw dust barrel or saw dust tray. If water of 180 degrees or higher is available, a plunge rinse of the parts will free them from the remainder of the burnishing soap solution and they should take on enough heat to dry themselves, but in such a case the rinse should be a thorough one and in at least two waters. If you do use a hot rinse, do not follow this by a cold water rinse as this will only set any remainder of soap film more firmly on the surface.

As to the saw dust drying out process we find saw dust being used made from almost every conceivable wood. Maple has always been considered the best, but as we stated in a previous paper we have found a fibre flour composed of corn cobs, corn stalk, maple sawdust and the dried bagasse of sugar cane, hammer milled down to a fine consistency to give the best results we have ever secured both from the point of view of its absorption properties as well as its added action as a splendid polishing medium.

The various details to which we have above referred are known to many foreman platers and we have often wondered why in so many plants the foreman plater is not accorded the important position he merits in the general production planning. If more manufacturers would only realize that their plater is the man who stands between their product and the public who is to buy it; that he knows what character of dies and also of metals will best respond to the latest plating procedure, and every step necessary to the production of a product that will fully satisfy the eye appeal of the ultimate purchaser, then he would be accorded the position in the plant personnel that he rightfully merits and should have. What we say here is especially true of those platers who are members of the American Electroplaters Society, and to whom the writer is under everlasting obligation for all of the assistance they have so freely given him in the solution of burnishing problems. They are a serious earnest body of men who for the greater part have devoted the best part of their business lives to the production of the finer finishes in all metals. Many manufacturers do not know and are apparently not interested in knowing how many evenings their foreman plater gives of his time to attend the night classes of his branch, of his study of analytical, chemistry and his work on the problems of the electrodeposition of the various metals, and that he does this

solely in the interest of bringing to his job all that is new and best in modern practice.

It makes no difference whether the plant be large or small or whether the production is of the highest quality or only ordinary "run of mill" variety, if the manufacturer will realize the important position of his foreman plater, he will call him into consultation along with the artists, designers, die sinkers and pressmen because he, after all, is the most competent to say what will or will not produce the best appearance on the product to be placed before the public. It is manifestly unfair to any plater for the manufacturer to go ahead, select the raw material, accept designs, use indifferent production methods in stamping, forming, casting or forging, and finally dump down at the plating room door a miscellaneous collection of parts and then say in substance to the foreman plater, "There you are, now go ahead and give us a finish equal to Blank & Company, our worst competitor." Platers hairs turn gray quickly enough without piling upon them added burdens, and we have never known a plant and never expect to see one, where the foreman plater sat in on every consultation, and had a voice in the matter of design, the selection of material, and the method of shop procedure, that the final and resultant product as coming from his department, was not outstanding.

NOTE: If you are the manufacturer of any product that you feel has an application in the barrel finishing of metal products, we would of course be glad to have you send descriptive matter which may be addressed to H. Leroy Beaver, Lansdale, Pa. We will be glad to give your literature a place in our permanent files and also test out and report to you the result of experiments with your product. **Please do not send samples of your product until we request them, which we will do as our research work requires.** For the time, a description of your product and its purpose will be sufficient and will be appreciated.

Janette Blower Wheels Bulletin 24-2. This four-page bulletin presents a line of blower wheels for every application, now being manufactured by Janette Manufacturing Company, 550 W. Monroe St., Chicago, Ill. The wheels are designed specially for use in oil burners, coal stokers, gas burners, motorized blowers, air conditioning equipment, and so on. Double inlet wheels are also available for slow speed applications.

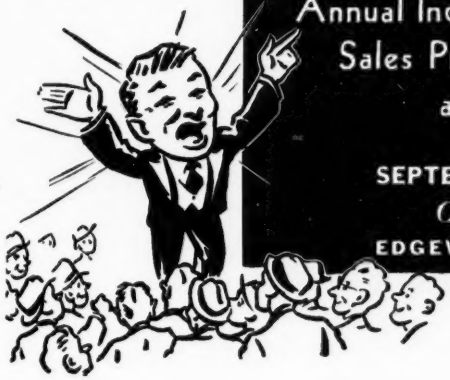
The features of the Janette blower wheels include scientifically curved steel blades which deliver a maximum volume of air with a minimum of noise, blade tips bent against the spring of the steel to insure tightness, blades made in pairs and welded to the back plate to insure the maximum strength, a rigid steel back plate, static balancing, baked aluminum finish on all wheels to resist corrosion. Copy of this bulletin free upon request.

Wright Hoisting Equipment. One of the most complete catalogs on hoisting equipment that has ever been issued was recently announced by the Wright Manufacturing Division of American Chain & Cable Company, Inc., York, Pa. Engineers, materials handling men, shop superintendents and others in similar capacities will find this new publication a valuable addition to their files as it is virtually a complete handbook on hoisting equipment.

In addition to complete specifications on Wright Hoists, Trolleys and Cranes, with special emphasis given to the Wright Improved Model High Speed Hoist, it includes suggestions on choosing a hoist as well as engineering tables on trolleys, cranes and I-beams. A special section is devoted to a description of Wright Electric Hoists. A new copy of this book will be supplied to those who use hoisting equipment.

Pulleys and Flexible Couplings. A complete list of the Congress line of V-grooved pulleys, variable speed pulleys, step-cone pulleys, and flexible couplings made by The Congress Tool & Die Company, Inc., 9030 Lumpkin Ave., Detroit, Mich., is now available. Copy free upon request.

N.I.A.A.



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Relation of Chromium Plating to Other Plating

By Dr. R. J. Piersol

THIS is the first of a series of articles covering various aspects of the theory and technique of chromium plating, including both lustrous chromium plating and hard chromium plating. In the present article it will be shown that, both historically and practically, chromium plating is based on the same fundamental principles as other metal plating such as gold plating, silver plating, nickel plating, copper plating, zinc plating and the plating of other metals.

In the presentation of the subject matter of these articles, an effort will be made to so define each technical term used and so describe each scientific principle involved that the meaning will be clear to the usual chromium plating operator who possesses a wealth of practical plating experience but has not received technical training in an engineering college.

Reasons for Commercialization of Chromium Plating

Although chromium had been plated in the scientific laboratory since 1847, industry did not become sufficiently interested in chromium plating to go to the expense of its commercial development until the period between 1923 and 1925. The reasons for the sudden commercial interest in chromium plating were three-fold.

Up until about the year 1923, the motor industry had been using varnishes for the finish of its automobiles which sometimes required as many as thirteen or fourteen coats and which took at least a week to dry. Also it was necessary to repaint an automobile every year or every other year in order to maintain the original luster of the finish. Then in 1923, a fast drying lacquer finish was developed which was sold under the trade name of Duco. With the advent of Duco and similar finishes and with the periodic application of a surface wax, it was possible to maintain the original beauty of the finish on an automobile for a period of five years or longer. In other words, the durability of the finish, when properly cared for, became as great as the average life of the car.

Ornamental parts on the automobile were nickel plated. The nickel plate was considered as being satisfactory since it usually retained its luster as long as the varnish finish. When the automobile was repainted each summer, the ornamental parts were replated. But with the advent of lasting automobile finishes there arose an urgent demand for a metal plating of unusual durability. The need was immediately recognized both by the purchaser and the manufacturer with the result that one of the progressive automobile companies began to use chromium plating for the ornamental parts which had been previously nickel plated. Thus, General Motors Corporation was successful in the commercialization of lustrous chromium plating for their particular needs within a period of three or four years. The development was carried on in its own research laboratories under the supervision of Mr. Wm. Phillips. For a period of several years, the

process was leased to various companies who manufactured plated parts for General Motors cars.

About this time, silver plating was tried on high intensity flood light reflectors but was found to be unsatisfactory for two reasons. When the floodlight was used outside, it was necessary to protect the reflecting surface from the weather. Consequently when the light was on, the temperature around the reflecting surface sometimes reached 300 deg. Centigrade. Subjected to this temperature for any great length of time, the silver plate oxidized rapidly and thereby lost its reflecting power. In cases where floodlights are used in large cities and near the ocean, the sulfur in the city smoke and the salt mist from the ocean breezes cause the silver to corrode rapidly.

At the same time when automobile research engineers were experimenting with chromium, the Westinghouse Electric and Manufacturing Company started the commercial development of lustrous chromium plating for the reflecting surface of floodlights because chromium plate retains its reflecting property at high temperatures and resists atmospheric corrosion to a remarkable degree. The research was carried out under the supervision of the writer. Within the usual period the research investigation was completed. The results were described and several chromium plated floodlight reflectors, one of which is shown in Fig. 1, were exhibited at the annual meeting of the Illuminating Engineering Society at Detroit in September 1925. Within a few years, the process had proceeded through the routine testing of the Materials and Process Division of the company and not only chromium plated floodlight reflectors, but also

Fig. 1—Dr. R. J. Piersol with floodlight reflector which has been chromium plated.

chromium plated electric irons, chromium plated electric toasters, and chromium plated electric ranges were being manufactured and marketed by this company. No attempt was made by Westinghouse to lease their commercial process to other manufacturers although various patent applications were made to protect their development from other possible patented processes of chromium plating. Attempts were made subsequently by both European and American patent holding companies to lease chromium plating processes to this company.

Also at this same time, the need became more pronounced for a harder and more lasting surface on large steel rolls used to make film for the motion picture industry. A large and progressive film company therefore started the commercialization of hard chromium plating in about 1923. This development was carried out by the Eastman Kodak Company on rolls from ten to fifteen feet in diameter and up to six feet in width. One of the rolls can be seen in Fig. 2.

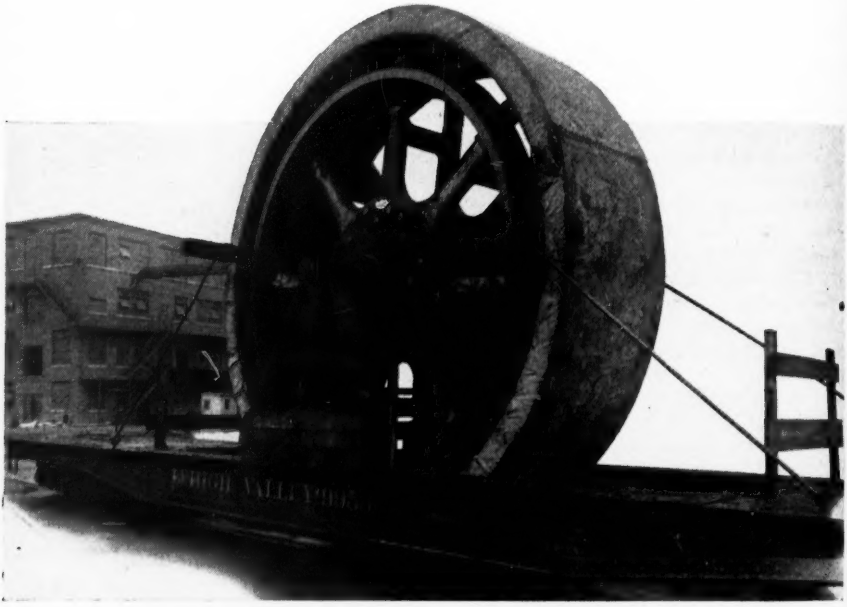

Fig. 2—Large steel rolls used to make film for the motion picture industry are plated with hard chromium.

Nature of Commercial Processes

The processes of chromium plating which were developed commercially by these three large companies, independently and concurrently, were all exactly the same in principle. They consist of the use of the so-called Sargent chromium plating bath. This bath is composed of about 250 grams per liter of chromic acid and about 2.5 grams per liter of sulfate. For lustrous chromium plating, the bath is operated at a temperature of about 45 degrees Centigrade and a current

density of about 100 amperes per square foot and a plating period of about ten minutes.

For hard chromium plating, the bath may be operated at the same temperature but preferably at a higher current density. This is because the hardness of the chromium increases with an increase in current density. The time of plating for a specified current density depends on the thickness of plate desired, the time often being several hours.

During and subsequent to the period of commercial development of chromium plating many patent holding companies arose, both abroad and in the United States. The purpose of these companies was to exploit patented processes of chromium plating and to collect revenue from the users of chromium plating. In the United States many of these patent leasing companies have ceased to exist and several of them have united to form the United Chromium, Inc. At the present time the United Chromium is the chief, if not the sole, licensing agency for chromium plating in the United States and licenses chromium plating to several hundred licensees.

The fabrication of metals is coincident with the dawn of civilization. Metals were wrought both for protective purposes and for ornamentation. Therefore, the art of fashioning metals was highly developed prior to the advent of electroplating. The dawn of electroplating naturally was delayed until the discovery of artificial means of producing large currents of electricity. The first electricity produced was by frictional machine. This was not suitable for electroplating because the current was too low.

Discovery of Electric Battery

Alessandro Volta of Pavia discovered the electric battery in 1800. His first voltaic pile consisted of alternate strips of copper and zinc separated by a wet cloth, which produced a differential voltage with resultant flow of electric current. History has honored Volta by giving the fundamental electrical unit of difference of potential the name volt.

Volta also found that two dissimilar metals, when immersed in a dilute acid and connected by a wire, would

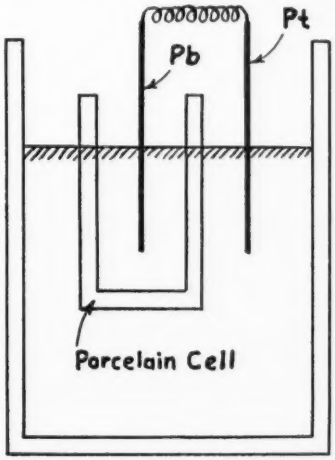

Fig. 3—Diagram of a Voltaic Cell.

cause a flow of current. For example, a strip of platinum and a strip of lead, as shown in Fig. 3, when partly immersed in a dilute sulfuric acid solution, causes current to flow between the connecting wire. In early tests, a porous cup was usually used to surround one electrode.

Volta also showed that the various metals could be arranged in a series so that each metal would be electropositive in respect to that metal immediately below it in the series. This is known as the electromotive series.

In addition Volta found that there are two types of electric current. Electricity passes through metals, including carbons, by a method known as metallic conduction. Subsequently it

has been discovered that this is actually electronic conduction, the current consisting of electrons which are the building units of electricity. The electron is approximately the size of one eighteen hundredth part of a hydrogen atom, which is the smallest of the chemical elements. The second type of electric current is that which passes through a solution, known as electrolytic current. In this instance, the current is carried by charged ions and therefore is called ionic conduction. The solution is known as an electrolyte.

Liberation of Gases at Electrodes

The discovery of Volta was immediately followed by the work of W. Nicholson and Sir A. Carlisle who found that when current was passed through water that the water was decomposed into its two ions, hydrogen and oxygen, hydrogen gas being liberated at the cathode or negative electrode and oxygen at the anode or positive electrode.

Also the discovery of Volta immediately resulted in William Cruickshank electroplating silver and copper from their chloride solutions. Also in 1807, Sir Humphrey Davy plated metallic potassium and sodium from potash and soda, respectively, thereby showing that potash and soda are not chemical elements as previously supposed.

The discovery of the electric battery and the discovery of electrodeposition immediately opened the field for the electrodeposition of various metals. But from the commercial standpoint it was necessary to await the discovery of the motor generator before industrial plating could be done on a large scale. Another article in this series will describe the developments on electroplating which followed, including the initial discovery of chromium plating by Junot.

Lyon Steel Shelf and Shop Boxes. An attractive new catalog on Steel Shop Boxes has just been published by Lyon Metal Products, Inc., Aurora, Ill. This new catalog completely illustrates and describes a wide range of steel boxes for every manufacturing and storage use—shelf boxes for the storage of small parts; shop and tote boxes for transportation of work in progress by truck, conveyor or lift truck; stacking boxes, nesting boxes; and suggestions for the use of special steel containers designed to be used with specific production systems. In addition, the new catalog contains brief descriptive matter on Steel Shelving, Lockers, Shop Equipment and Tool Storage Equipment. Copy free upon request.

Blackmer Rotary Hand Pumps. Users of hand pumps for the pumping of liquids from one room to another, or from one story level to another, or for pumping oils or cutting compounds from tanks will be interested in a four-page folder which is now being issued by Blackmer Pump Company, 1810 Century Ave., Grand Rapids, Mich. This folder describes the Blackmer pump with the "bucket" design. This pump is said to be easy turning, to provide a continuous flow and to have a 20-ft. suction lift. The pump can be supplied as a pump only, or with a wall bracket, with a spout, bung and suction pipe, or with bung, suction pipe, discharge pipe, elbow, hose and nozzle. The pump is supplied in five different types, the Series 404 with a capacity of 10 gal. per minute; Series 405 with capacity of 12 gal. per minute; Series 605 with capacity of 25 gal. per minute; Series 800, the capacity of which depends on the material being pumped, and the Series 609 which has a capacity of 20 gal. per minute. Copy of the folder free upon request.

Extra Smooth Leafing Aluminum Finish; Blue Knight Leaflex No. 5900. This is the title of a product summary which is now being issued by Roxalin Flexible Lacquer Co., Inc., Box 775, Elizabeth N. J., giving the properties of Blue Knight Leaflex No. 5900, a cellulose type, air drying, flexible lacquer enamel for low cost finishing. Samples on brass are supplied for testing by scratching, bending, and so on. A copy free upon request.

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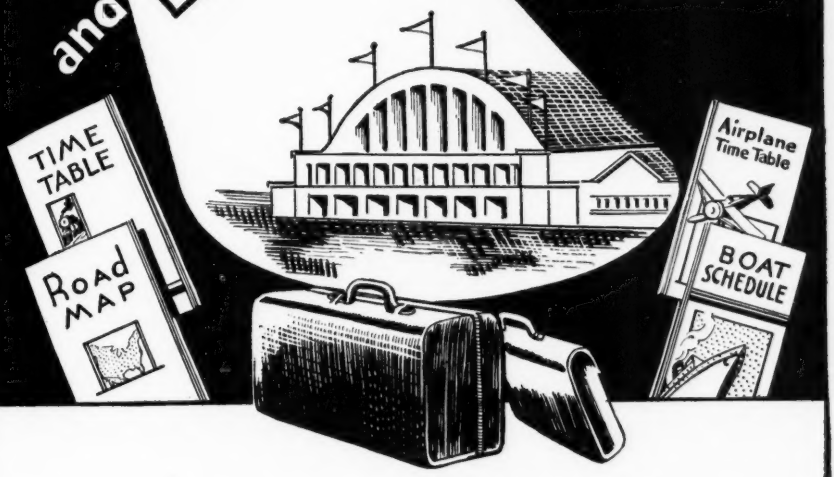

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Standard Paint Specifications Give Industry Uniform Product

American Standards Association, Approving Eleven A.S.T.M. Standards for Pigments, Recognizes Concensus of Producers and Users

By H. E. Smith

Chairman, Subcommittee XV, Pigments, A.S.T.M. Committee D-1 on Paint, Varnish, Lacquer and Related Products

IT IS a long road from the crude and dull earth colors which centuries ago formed the first pigments, to the present-day synthetic colors that rival the rainbow. Yet, curiously enough, although we can describe and specify quite closely the latest synthetic colors, we really cannot say fully and precisely what constitutes some of the earth colors. We, ourselves, have made the synthetics and know what we put into them, but Nature made the umbers and the siennas and did not record the formulas. Progress is being made, however. The necessity for correct and complete description of pigments and paints is obvious.

The small consumer may, with reason, confine his purchases of paint to well established varieties and mixtures as furnished by makers who, his experience shows, are successful in producing durable and otherwise satisfactory goods. This remains true, even though he pay a little higher price. The difference really represents, in part, the careful research and routine testing which the producer does for him. And even though an occasional lot is not up to the desired standard, the small consumer is reasonably well served.

Specifications Essential

Not so the large consumer—a small difference in unit price multiplies to a considerable total on his larger purchases. A deficiency in quality likewise, by multiplication, becomes important with the larger use of the material. It is therefore necessary for him to describe in detail exactly what he wants—in short, to use a specification. Also it is essential that he test shipments to determine whether he receives what he specifies. Only thus can he be certain of the best material at the lowest price.

Early in the study of plants by technologists the need appeared for accurate specifications for the pigments, which would enable the purchaser to buy uniform and satisfactory products in the open market from any competent manufacturer. The World War emphasized this need, especially for Federal Government departments. The railroads, also large consumers of paints and at that time under the jurisdiction of the U. S. Railroad Administration, were included. An Interdepartmental Com-

mittee was formed to write specifications for the needed paints and pigments. This committee later grew into the paint section of the Federal Specifications Board.

For industry in general the work was taken up by the American Society of Testing Materials. A subcommittee was formed to prepare specifications for the pigments and in 1921 it reported several specifications. These were adopted as tentative. They were based largely on those of the Interdepartmental Committee.

The specifications, which later became A. S. T. M. standards, have been revised from time to time to keep pace with the progress of the industry. Other specifications were in later years added to the list. The results represent the practical experience of both producers and consumers, both of whom are included in the working subcommittee.

The pigments which were most largely used at the time were, naturally, the first to receive attention. Of those now offered to the American Standards Association, zinc oxide, basic carbonate white lead, red lead, and mineral iron oxide were first adopted as tentative in 1921. Chrome yellow and reduced chrome green were first issued in 1925 and the two blues, ultramarine and prussian, in 1927. All have been revised, as necessary, during the intervening years. The specifications therefore represent extended study and experimentation.

The development of A. S. T. M. specifications for pigments has, incidentally, been the occasion for developing the manufacture of fine wire sieves or screens in the United States. Previous to the World War the 325-mesh sieves for testing the fineness of pigments were made by a factory in Alsace-Lorraine which was destroyed during the war. For a time, suitably fine sieves were not obtainable.

At the request of Government and A. S. T. M. technologists, American makers undertook the difficult task of producing wire and cloth of the required fineness and uniformity. That which is used for the specified 325-mesh sieve has wires only 0.0014 in. in diameter and the opening between the wires is only 0.0017 in. In addition, the openings are required to be uniform within 8 per cent plus or minus. Pigments, all of whose particles are 0.0017 in. in diameter, would not be satisfactorily fine for good paint but in the process of grinding so that the required 97 to 99 per cent will pass the sieve, the large majority of particles are ground much finer, thus the desired result is obtained.

The white pigments represented by the above and other A. S. T. M. specifications are the base of practically all of the first-quality white and tinted paints. In the deeper colors there is a greater variety. Some are used in comparatively small quantities and have not yet reached the specification stage. The number of specification pigments is, however, constantly increasing. And, really, specifications may be desirable even for articles of small consumption. A small percentage of an incorrect or inferior component may do a large percentage of harm.

Accepted as Standard

A large part of the entire production of the older white pigments is to the standard of A. S. T. M. specifications. A purchaser may order from a reputable maker by definite reference to these specifications, or, if such reference is omitted, the manufacturer will accept the specifications as a standard and as satisfactory basis for any discussion which may arise. Red lead, though essentially a metal protective rather than a decorative pigment, is on practically the same basis.

Of the colored pigments, mineral iron oxide, lampblack, chrome yellow, chrome green, ultramarine blue, and

prussian blue, now adopted by the American Standards Association, there are various grades and shades. The specifications are so drawn as to include all shades. With respect to grade or quality, they represent good and reliable commercial products.

All of the specifications under consideration define the material by the kinds, properties, and percentages of the essential components and by suitable limitations on the impurities, as required. Physical properties are also specified as needed. Occasionally, as in the case of red lead, more than one grade is included, thus giving the purchaser the opportunity of selecting the commercial products best suited to his needs.

Broad Membership

The specification committees of the American Society for Testing Materials include in their memberships representatives of numerous large consumers, and it is reasonable, therefore to expect that their specifications will be extensively used. This may be by direct reference, or, more frequently, by the use of practically the same requirements in the consumers' own specifications.

The Government departments buy largely on the specifications of the Federal Specifications Board, whose requirements for these pigments are similar to those of A. S. T. M.

The pigments which find large use in railroad painting are few in number. The whites bought as such or as constituents of mixtures are very largely to A. S. T. M. standards, either by direct specification or frequently on account of the standards maintained by the paint maker. The purchase of colored pigments in large lots by railroads is limited to a few varieties. In some cases specifications on the A. S. T. M. basis are quoted directly; in others they come in through the makers' standards. Similar conditions exist among various other large purchasers.

The practice well merits extension. The adoption of the specifications by the American Standards Association is a long step in this direction. The use of the specifications as standards by the manufacturers is highly important because it gives to the small consumer who has no specification system nor testing laboratory the benefit of carefully studied standards. In the ultimate development, a retail purchaser should be able to purchase a gallon of paint of standard and good quality with the same convenience and confidence as he now buys a bag of certified fertilizer or a quart of Grade A milk.

A. S. T. M. Paint Standards Get ASA Recognition

Eleven specifications for pigments, prepared by Committee D-1 on Preservative Coatings for Structural Materials of the American Society for testing materials have been accepted by the American Standards Association as meeting requirements for approval as American Standards. These specifications have been in effect as A. S. T. M. standards for some years and the approval given them by the ASA at this time is a recognition of their important national standing.

These eleven American Standard specifications are:

Zinc Oxide (ASA K22-1937; A.S.T. M. D 79-24)

Basic Carbonate White Lead (ASA K23-1937; A.S.T.M. D 81-34)

Red Lead (ASA K24-1937; A.S.T. M. D 83-31)

Mineral Iron Oxide (ASA K25-1937; A.S.T.M. D 84-27)

Lampblack (ASA K26-1937; A.S.T. M. D 209-30)

Chrome Yellow (ASA K27-1937; A. S.T.M. D 211-27)

Reduced Chrome Green (ASA K28-1937; A.S.T.M. D 213-27)

Prussian Blue (ASA K29-1937; A.S.

T.M. D 261-28)

Ultramarine Blue (ASA K29-1937; A.S.T.M. D 262-28)

Commercial Para Red (ASA K31-1937; A. S. T. M. D 624-28)

Copies of the specifications are available from the American Standards Association, 29 West 39th Street, New York, or from the American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pennsylvania, at 25 cents each. ASA Members are entitled to 20 per cent discount on approved American Standards, when ordered through the ASA office.

—Reprinted from the June 1937 issue of "Industrial Standardization"

Bristol Round-Chart Potentiometer Pyrometer Controller Bulletin. A 12-page bulletin on Bristol's recently developed Round-Chart Potentiometer Pyrometers has been announced for distribution by The Bristol Company, Waterbury, Conn. These instruments are available as temperature recorders and controllers in both pneumatic and electrically operated types. The bulletin describes the construction of Bristol's Potentiometer Pyrometers, giving the special features made possible by the greatly simplified principle on which these instruments operate. Samples of the 12-in. round-charts are also shown, together with available ranges. Copies free.

Clark Lift-Jack Units. The modern method of loading, handling and storing materials on skids and the manner in which these skids can be handled by the use of Clark Lift-Jacks is discussed in a six-page folder now being issued by All Steel Welded Truck Corporation, 1123 Railroad Ave., Rockford, Ill. Copy free upon request.

Cameron Motorpumps. Ingersoll-Rand Company, 11 Broadway, New York, N. Y., has issued a new catalog describing its Cameron Motorpumps. These pumps are compact machines combining electric motor and centrifugal pumps in a single unit. Capacities range from 5 to 1000 gallons per min. for heads to 500 ft. Motor sizes range from ¼ to 40 h.p. Copy free upon request.

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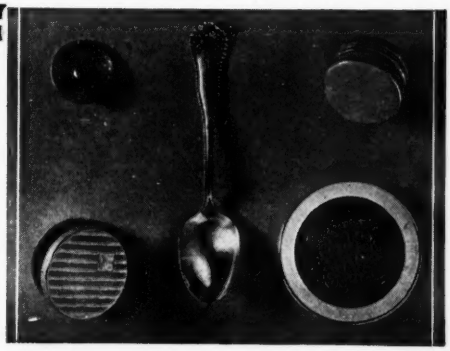

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Question: We have been experimenting for quite some time with various formulas for oxidizing brass. To date, we have not had much success and are writing to ask if you could give us any information concerning this finishing process.

Answer: A blue grey or blue-black color can be produced on brass by boiling the brass parts in the following solution until the proper color is obtained. This usually requires between 10 to 20 minutes.

Sodium thiosulphate (hyposulphite of soda) ..... 8 oz./gal.
Lead acetate (sugar of lead) 4 oz./gal.

Another solution may be made of the same ingredients by varying the concentration with a view to changing the color. This solution is as follows:

Hyposulphite of soda.....12.8 oz./gal.
Sugar of lead.....25.6 oz./gal.

An entirely different solution may also be used to produce the blue-black finish.

Copper carbonate .....16 oz.
Ammonia (concentrated) ..... 1 quart
Water ..... 3 quarts

Add the water after the copper carbonate and ammonia have been thoroughly mixed. Use the solution at a temperature of 175 degrees Fahrenheit and immerse the work until the proper color is obtained. This usually requires one-half to one minute. For operation over a period of time there must be an excess of copper carbonate present.

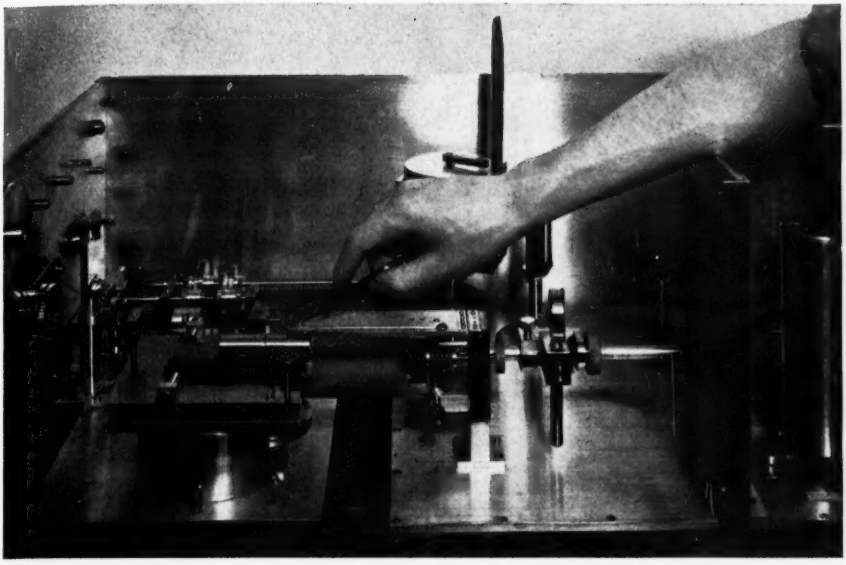
Answered by Ezra A. Blount.

Spraying Booths Ventilated By the Air Syphon Principle

By JOHN E. HYLER

ONE of the important developments of recent years in spraying finishing materials, especially such materials as are of highly inflammable nature, is the so-called syphon principle which, though using a motor for the power to drive the ventilating fan, has the motor so isolated from the booth proper that there can be no danger of a spark setting off an explosion. The principle involved is to arrange a duct leading to the open air from the booth, and introducing into this duct an inlet, directed toward the outlet end of the duct.

Where the inlet occurs, there is an annular piece of metal, so baffled toward the booth end that the only possible direction of air travel is toward the duct outlet. Later, the annular baffle ends, and only the duct proper remains. Through the inlet, a blast of air is delivered into the duct and kept flowing toward the outside. This induces a syphon or suction action at



With this device irregularities ordinarily invisible to the naked eye are magnified so that they look like mountain ranges.

the booth end of the duct, so that the explosive vapors are drawn continually away, even though the motor is far out of the danger zone.

Photographing Finish On Polished Steel

A fine diamond point, a tiny high-grade mirror mounted on a hinge of metal five ten-thousandths of an inch in thickness, and a magnifying system of reflecting mirrors are the "jewels" of this sensitive device which photographs surface irregularities of highly polished steel. The irregularities may be magnified 1700 times vertically and 64 times horizontally.

The machine is known as a profilograph and was designed by University of Michigan engineers. The above unit, the third of its kind in the world, is a part of the equipment in the new chemical and metallurgical laboratory that has been built for the Ford Motor Company.

In the above view, the pencil points to the tiny mirror. Below the mirror is the diamond point, and beneath that the Ford V-8 piston pin specimen. As the specimen moves along under the diamond point, minute irregularities cause the mirror to bob up and down. A beam of light focused on the mirror from the cylindrical lantern at right is reflected to the system of mirrors and finally to a photographic negative on a revolving drum.

The path of the diamond point over one-eighth of an inch of a specimen is recorded on the negative as a line eight inches long, on which irregularities invisible to the naked eye, magnified 1700 times, may look like mountain ranges.

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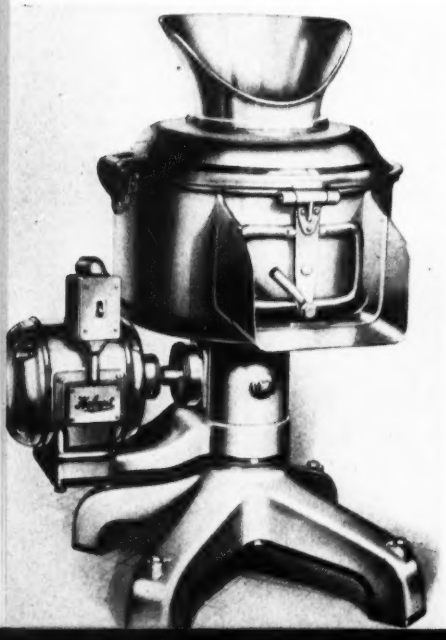
(Right)—A black, crinkle enamel finish increases the wear resistance and adds beauty to this extremely compact and sturdy universal motor.

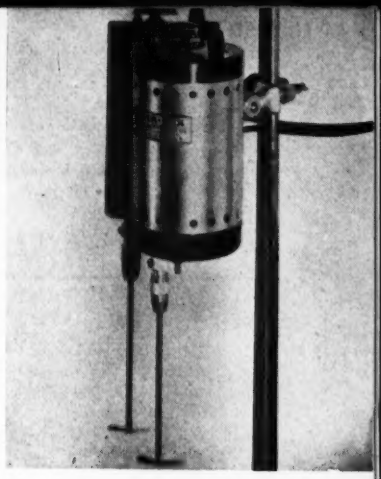
(Photo Courtesy of The Dumore Co.)

(Photo Courtesy The Hobart Manufacturing Co.)

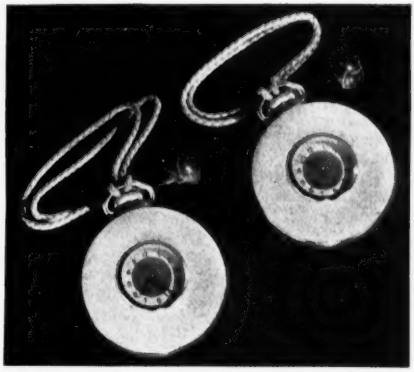


(Left)—The potato peeler shown herewith is finished with six coats of French Gray enamel and trimmed in dark blue.

(Right)—The motor ends of this beautifully polished mixer are shielded with lustrous bakelite. The same material is also used for the rheostat knob and the special fuse housing.



(Photo Courtesy of Bakelite Corporation)



(Photo Courtesy Sherwin-Williams)

(Left)—Lapel watches, such as those shown herewith, are finished in bright colors of unusual durability.

(Photo Courtesy of The National Acme Company)

(Right)—The housings of these instruments were enameled and then heated in an oven. The attractive wrinkle finish is the result.

NEWS *of the* INDUSTRY

Solvent Degreasing Concern To Build New Factory

The increased demand for Solvent Degreasing equipment brought about by the modernization and general expansion of metal fabricating and finishing plants and the addition of many new concerns has forced the Detroit Rex Products Company of 13017 Hillview Avenue, Detroit, Michigan, to seek larger manufacturing facilities for the second time within a year.

This company, formerly known as the Rex Products & Manufacturing Company, manufactures a complete line of standard and special solvent degreasing machines, Perm-A-Clor and Triad Solvents, and Triad Alkali Cleaners and Strippers. Branch offices are maintained at 130 West 42nd Street, New York, New York; 201 North Wells Street, Chicago, Illinois; and 812 Huron Road, Cleveland, Ohio.

The new modern factory building—to be erected on a plot of land adjacent to the main office building—will be 100 ft. wide by 300 ft. long of a single story monitor type design with a two-story front containing spacious and well-lighted engineering offices, drafting rooms, and a new and completely equipped research laboratory. The building will be of a general brick, concrete, and steel sash construction.

The increased production facilities made possible by this new factory will enable the company to speed up delivery on all designs and sizes of degreasing machines, and assist the company in maintaining its leadership in the industrial cleaning field. A complete engineering service on metal cleaning is furnished to all customers and prospects.

Erlenmeyer Appointed Western New York Representative for Maas & Waldstein

Floyd M. Erlenmeyer has been appointed Western New York representative for Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J. Mr. Erlenmeyer has had wide experience in industrial finishing, since he has in the past been engaged in both the manufacture of finishes and their practical application. He is well equipped to serve in the territory he will cover, and his many friends in the industry will welcome him in his new capacity. He will make his headquarters at 253 Alexandria St., Rochester, N. Y.

Dust Control Association Reports Successful Convention in Cleveland

The Dust Control Equipment Association at its meeting in Cleveland early in June gave careful attention to reports from the engineering committee of the Association dealing with work in establishing standards of dust control practice, the need for which has existed for quite some time.

The Association endorsed the recommendations of the engineering committee with regard to the adoption of a friction chart and the development of a formula for use in connection with that chart.

During the meeting the Association was addressed by Mr. Theo. Hatch, Associate Dust Control Engineer, Division of Industrial Hygiene, Department of Labor, State of New York, on the subject "Importance of Modern Standards and Methods of Dust Analysis upon Design and Efficiency of Dust Control Equipment."

Mr. Hatch, who spoke in the light of his personal knowledge and opinions rather than as representing the rules and regulations of the Division of Industrial Hygiene of his home state, discussed methods used in cleaning dust from air in South African gold mines. He went into considerable detail on the question of the size of dust particles and the relative importance of the different kinds of dust. He then discussed in some detail the various types of equipment available for determining dust count and showed why he considered it unsatisfactory to attempt to establish factors on the basis of a very close determination.

Houghton Research Staff

In line with plans which have been under way for some time, the organization of the Houghton research staff was recently announced by Major A. E. Car-

penter, president of E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa. The organization of this staff is designed to keep the high standards of Houghton research and service in line with the increasing demands of industry.

Every man on the Houghton staff is a specialist in his particular field. This staff is set up to function with the utmost speed and efficiency, and its primary requisite is to render impartial and expert service to customers and industry as a whole.

The staff is made up of five divisions —textile, industrial lubrication, metal working, leather, and leather oils and greases. Each division is headed by a research engineer whose duty is threefold. He works to develop new products, to better existing products when possible, and to lend real service to individual concerns in the industry he covers.

The research staff is under the supervision of Mr. L. D. Holland, manager of marketing research. In the textile research division are the following men: H. C. Roberts, Dr. E. R. Manning, Albin Johnson, and C. L. Shelton. Mr. C. P. Geen is the manager of the industrial research division. Mr. G. W. Esau, O. M. Gibson and E. L. Ward are in charge of the metal working research division. J. N. Smith, A. Ruwell, and R. Keane are in charge of the leather research division.

Linde Completes New Oxygen Plant

The Linde Air Products Co., 205 East 42nd St., New York, N. Y., has announced the opening of a new oxygen plant on Powhattan Ave., Essington, Pa. This plant will provide adequate facilities for the oxygen requirements near Philadelphia. This brings the total number of Linde oxygen plants serving the oxy-acetylene welding and cutting needs of industry throughout the United States to 70. The oxygen requirements within the city limits of Philadelphia will be served, as formerly, by the Linde plant at 18th and Cambria Streets.

Everett Graff Elected President of Ryerson Company

At a recent meeting of the Board of Directors of Joseph T. Ryerson & Son, Inc., 2558 West 16th St., Chicago, Ill., Everett D. Graff, first vice president, was elected president. Mr. Graff has been with the Ryerson Company for 31 years, having come with the company immediately upon graduation from college in 1906.

Edward L. Ryerson, Jr., is chairman of the Board of the Ryerson Company

Everett Graff, Newly Elected President of Ryerson Company

and vice chairman of the Inland Steel Company.

W. F. Kurfess, assistant vice president, was elected vice president, and V. H. Dieterich, assistant vice president, was elected vice president. Ainslie Y. Sawyer, formerly assistant vice president, was made assistant to the president.

The Ryerson Company, merchandising subsidiary of the Inland Steel Company, is said to represent the largest steel distributing organization in the country, with warehouses in 10 principal industrial centers. During the past year remarkable strides in plant modernization have been made.

General Electric Opens Display of Electrical Products for Industry

An exhibit of electrical products for industry has been opened in the General Electric Building, 570 Lexington Ave., New York City, N. Y. It brings together, in 7,000 sq. ft. of floor space, a complete line of representative products of General Electric and its affiliates.

Cable distribution equipment, frac-

tional-horsepower and integral motors, industrial control, industrial heating, lighting, meters and instruments, police radio, switchgear, transportation products, turbines and welding; the products of the incandescent lamp department, air conditioning department, and the construction material department; and the products of the Trumbull Electric Company, General Electric X-Ray Corporation, Warren Telechron Clock Company, General Electric Vapor Lamp Company, Bailey Meter Company, Locke Insulator Corporation and Carboloy Company are on display. Much of the equipment is in operation.

Adjoining the exhibit room is a conference Room, provided with tables and chairs for holding lectures and showing motion picture films. Three arc welding sets may be demonstrated, and welding is carried on inside the welding booth.

Since it is impossible to exhibit products of the transportation department in the room, a large display panel gives a picture story of the part General Electric plays in transportation, and a small-scale model shows the main propelling equipment of a twin-screw turbin-electric-driven ship.

A generator voltage regulator is in operation, giving visitors the opportunity to see the stabilizing effect of a regulator on voltage surges. Three induction voltage regulators are also in operation.

A demonstrator shows the effect of voltage regulation on power and distribution lines, and a large panel shows why fuse co-ordination pays big dividends. Here fuses are made to blow in a fuse cut-out rack, demonstrating fuse co-ordination from the load to the supply.

The story of instruments is presented by means of a series of transparencies. Time switches, demand meters, recording instruments, portable instruments, small panel instruments, and watthour meters are represented in the exhibit.

By means of cable dumb-bell samples, visitors may test the strength of various rubber insulations both before and after undergoing heat, aging, and moisture tests. Stripped-down samples of cable show internal construction features.

In the motor exhibit, photographs show the various tests which G-E motors must pass before shipment. The center of the exhibit is an induction motor in a glass house, operating in cement dust blown about by a vacuum blower. On either side of this exhibit are tables, on which assembled and completely disassembled motors are shown.

An FP-19 automatic oil circuit recloser is in operation; bells ring when visitors accidentally cross the path of a photoelectric beam; manual, automatic, and float-switch controls of a disc-brake motor are demonstrated by means of a special control panel.

Police radios and accessories; fractional and integral horsepower motors and control; semiflush switchgear; turbine blades and diaphragms, with an exhibit showing the steps followed in flash-welding blades to turbine diaphragms; a mechanical-drive turbine with top lifted to show its internal construction; display cases picturing the process of electric furnace brazing, annealing, and normalizing, together with samples of finished heat-treated products, welding electrodes and accessories —these are but a few more of the variety of products in the exhibit.

A different type of illumination, supplied by the incandescent lamp department, illuminates each bay to illustrate good industrial and commercial lighting.

The Neville Company Appoints Representative in New York

The Neville Company, Neville Island P. O., Pittsburgh, Pa., has announced that effective July 1, Calo & Lydon, 90 West St., New York City, will act as its sales representative in the metropolitan New York district. Better service and closer contact with the consuming trade will thus be assured by this connection.

Patterson Foundry & Machine Company Begins Expansion Program

The Patterson Foundry & Machine Company, East Liverpool, Ohio, has recently announced a comprehensive plan to double the production facilities of the company. As an initial step in this program, additions to the machine and fabricating divisions have increased the capacity of these two departments approximately 50 per cent, while the construction of a new tunnel kiln at the Porox Division will greatly increase the capacity of that department in the production of Porox lining blocks and grinding balls.

The Patterson plants are running to capacity. The contemplated increase in production facilities will enable The Patterson Company to approach new markets to which they have heretofore been unable to cater. The Patterson

Company manufactures crushing, grinding, mixing, and processing equipment of all kinds.

New York Belting & Packing Co. Makes Appointments

J. W. Webster, until recently operating with headquarters in Richmond, Va., has been appointed sales manager of the South Atlantic District for the New York Belting & Packing Co., with headquarters in Atlanta, Ga. The territory comprises the states of Pennsylvania, eastern Kentucky and Tennessee, Alabama, Florida, and east to the Atlantic Ocean.

Robert W. Crane will make his headquarters in Buffalo, N. Y. From this point he will cover New York state, west of the Hudson River, and northern Pennsylvania.

Edward M. Powell, chief clerk of the Chicago warehouse, has been appointed to the sales force of the company in the Chicago District. He has been in the employ of the company since April, 1929. J. W. Casper, who has been with the New York Belting & Packing Co. in charge of the Chicago warehouse stock, has been appointed chief clerk to assume E. M. Powell's duties.

Cribben & Sexton Announce Extensive Expansion

Cribben & Sexton Company, Chicago, Ill., are making extensive improvements in their porcelain enameling department, including the installation of a gas-fired radiant tube type continuous furnace. The installation of the furnace is being handled by the Ferro Enamel Corp., 4150 East 56th St., Cleveland, Ohio. The improvements are expected to be completed in about four months.

Ward Leonard Electric Company Announces Appointments of Representatives and Distributors

Ward Leonard Electric Co., South St., Mount Vernon, N. Y., has announced the appointment of Mr. John S. Clark, P. O. Box 143, Station A, El Paso, Texas, as their representative for the sale of the complete line of Ward Leonard electric control devices. Mr. Clark's territory covers the eastern half of Arizona, the State of New Mexico and the western portion of Texas.

The New York office under the management of Mr. R. B. Anderson will cover the Metropolitan area and New Jersey. The Chicago office under the management of Mr. R. W. Anderson covers Wisconsin, eastern Iowa, Illinois, and northern Indiana.

The Triangle Equipment Company, 50 Church St., New York, N. Y., and 330 S. Jefferson St., Chicago, Ill., are now representatives for the sale of starters, controllers, contactors, and disconnect switches.

The Brance-Krachy Co., Inc., 4411 Navigation Blvd., Houston, Texas, is now the representative for the sale of Ward Leonard electric control devices in the southeastern portion of Texas.

Pioneer Engineering & Manufacturing Co., Inc., Announces New Distributor

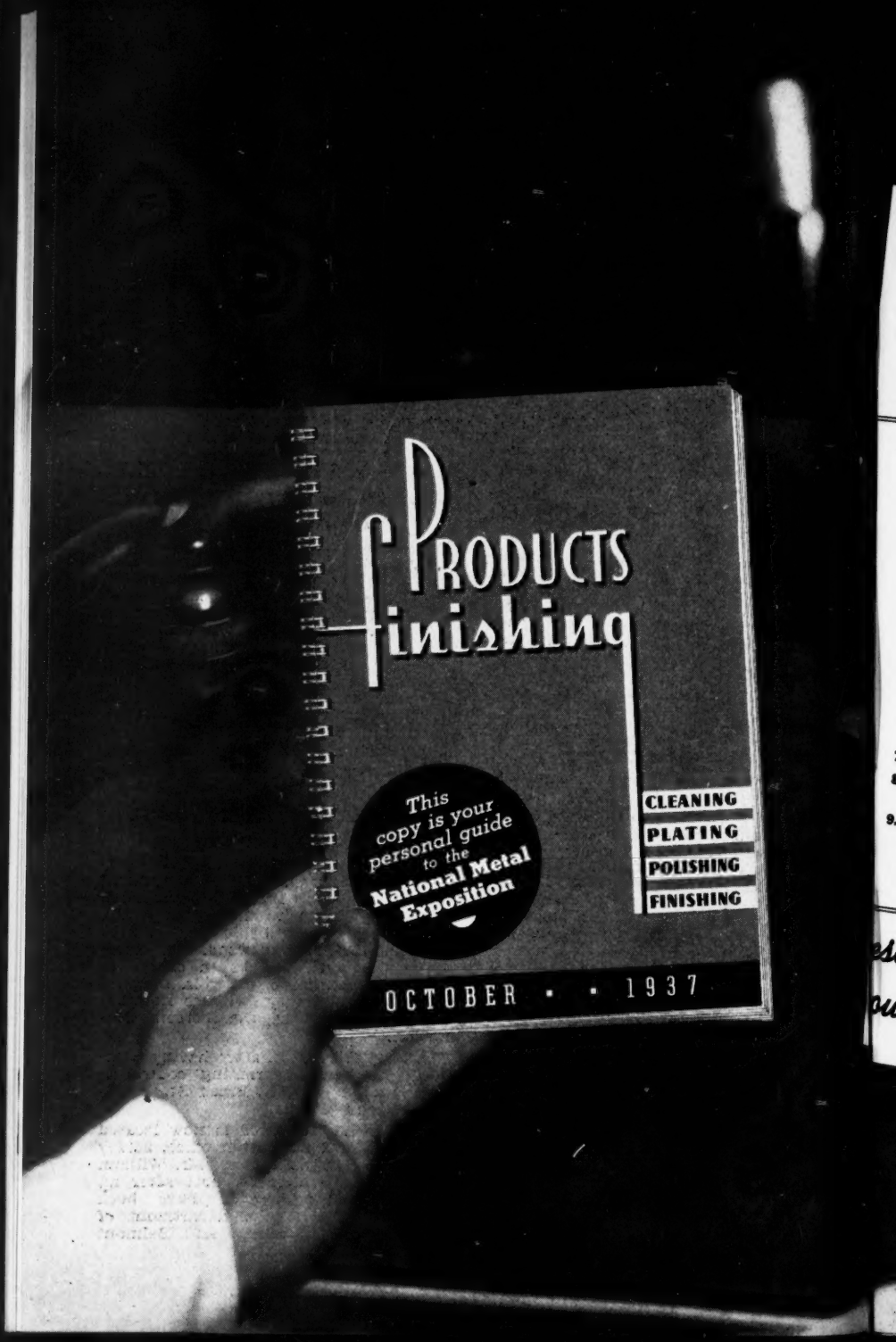
Pioneer Engineering & Manufacturing Co., Inc., 31 Melbourne Ave., Detroit, Mich, manufacturers of the "Pioneer" and "Rollway" lines of coolant and lubricant pumps has recently announced the appointment of Burklyn Machinery Company, Syracuse, N. Y., as general distributor in that city. The Burklyn Machinery Company will carry in stock a number of sizes and types of both the "Pioneer" type and the "Rollway" type pump to be able to take care of the requirements of the industries served by them.

Mercoid Corporation Makes Appointments

The Mercoid Corporation, 4213 Belmont Ave., Chicago, Ill., has announced the appointment of Mr. Bassett Lerch as sales representative in St. Louis, Mo. Mr. Lerch, who will be located at 8787 Bridgeport Ave., Brentwood, St. Louis County, Missouri, will be in charge of the sale of automatic controls, mercury controls, and mercury switches now being manufactured by the Mercoid Corporation.

Mr. Paul J. Provost, after having completed the Mercoid training course, is now located at 3137 N. Broad St., Philadelphia, Pennsylvania.

Mr. Russell MacDonald is now located with Mercoid at its Boston office, 25 Ivy St., Boston, Massachusetts. Mr. William Ufer and Mr. Walter Lischett after an extensive training period have been transferred to the sales department of The Mercoid Corporation, 4201 Belmont Ave., Chicago, Illinois.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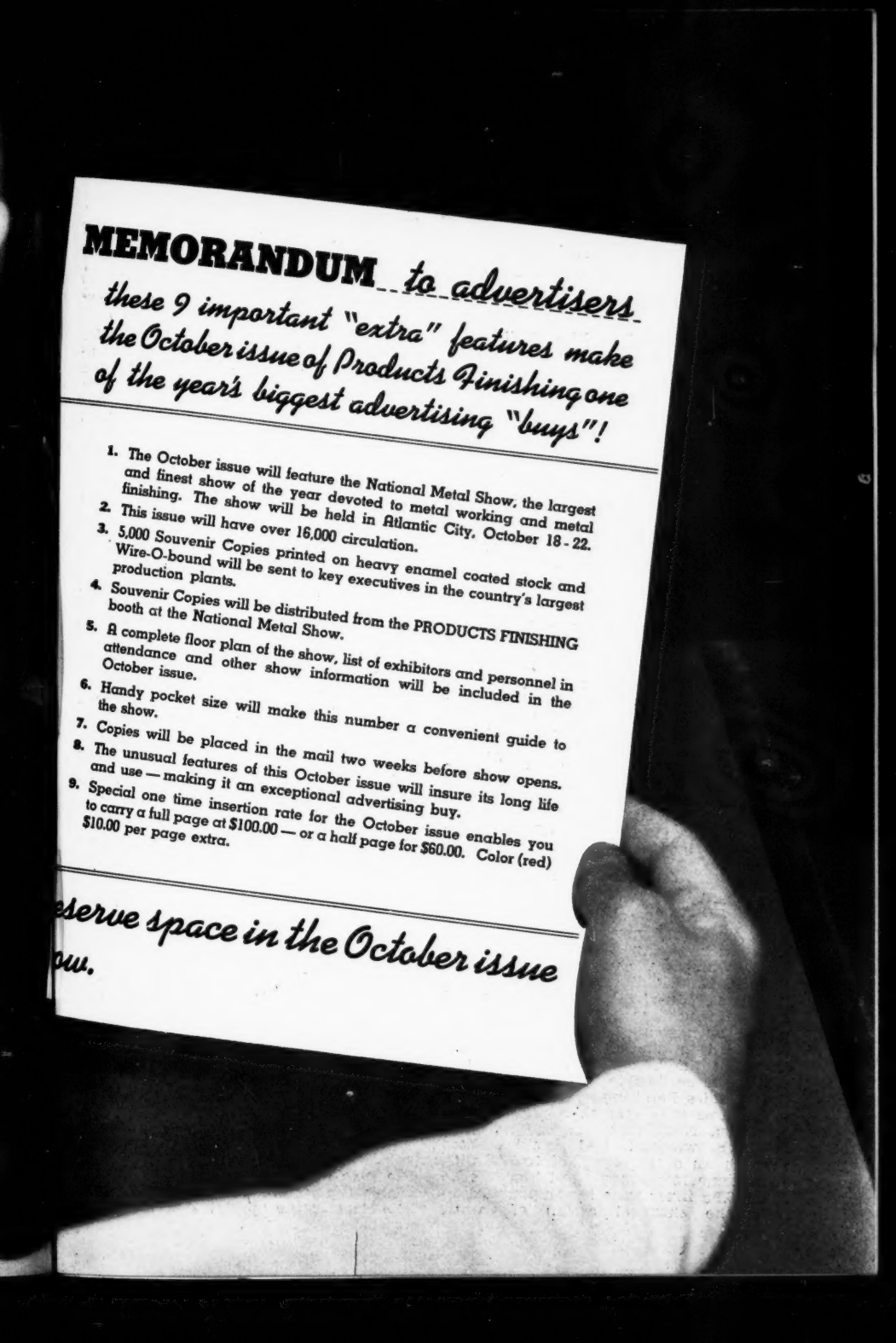
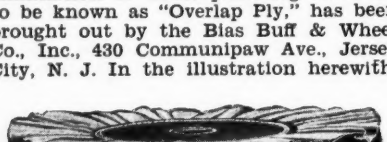

MEMORANDUM to advertisers
these 9 important "extra" features make the October issue of Products Finishing one of the year's biggest advertising "buys"!
1. The October issue will feature the National Metal Show, the largest and finest show of the year devoted to metal working and metal finishing. The show will be held in Atlantic City, October 18 - 22.
2. This issue will have over 16,000 circulation.
3. 5,000 Souvenir Copies printed on heavy enamel coated stock and Wire-O-bound will be sent to key executives in the country's largest production plants.
4. Souvenir Copies will be distributed from the PRODUCTS FINISHING booth at the National Metal Show.
5. A complete floor plan of the show, list of exhibitors and personnel in attendance and other show information will be included in the October issue.
6. Handy pocket size will make this number a convenient guide to the show.
7. Copies will be placed in the mail two weeks before show opens.
8. The unusual features of this October issue will insure its long life and use — making it an exceptional advertising buy.
9. Special one time insertion rate for the October issue enables you to carry a full page at $100.00 — or a half page for $60.00. Color (red) $10.00 per page extra.
eserve space in the October issue
ow.

New Plant Equipment and Materials

Bias Overlap Ply Buff

A buff which is said to give the highest degree of service and also aid in the elimination of waste polishing material, to be known as "Overlap Ply," has been brought out by the Bias Buff & Wheel Co., Inc., 430 Communipaw Ave., Jersey City, N. J. In the illustration herewith,



Bias Overlap Ply Buff

arrows point to pockets or puckers in the cloth. This doubling or puckering the cloth helps to retain the polishing compound and is said to provide fast cutting force on each face per section.

Another feature is the cloth of the buff, which is cut on the "bias" principle. Threads are prevented from pulling out, and the cloth does not waste as it wears, thus the life of the buff is said to be prolonged from 25 to 50 per cent. The buff is provided in various sizes.

Eclipse "Du-al" Hose

A new development in spray painting hose has been announced by Eclipse Air Brush Company, Inc., 79 Orange St., Newark, N. J. This new hose is to be known as "Du-al." It combines air and fluid hose into one unit, the tubes being united by a web of solid rubber which is molded in one piece with the outer casing of the hose. The combination is said to be as flexible in use as a single line, besides handling easily.

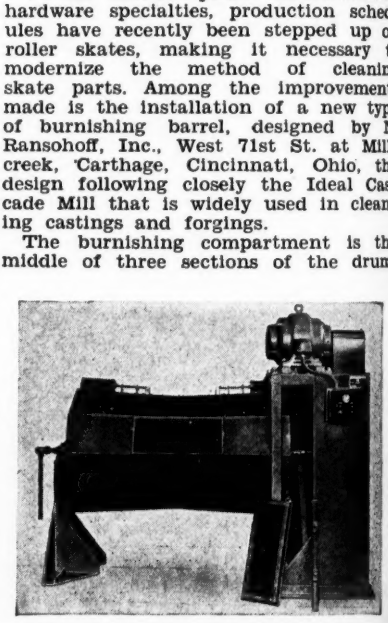
The hose is of special, reinforced construction, combining the best features of both wrapped and braided hose through an arrangement of braids with an intermediate wrapping of high tensile cords. The inner tube is compounded to resist the chemical action of paints, lacquers, and so on, and the outer sheath to resist chemical as well as abrasive wear. No writhing or torque is experienced even when different pressures are used on opposite sides.

For making standard connections, enough of the web can be removed to spread the hose to the required outlets and further spreading can be prevented by a tightly fitting collar. Du-al hose is available with 3/8 in. fluid passage and 5/16 in. air passage.

Ransohoff Burnishing Barrel

At an eastern plant manufacturing hardware specialties, production schedules have recently been stepped up on roller skates, making it necessary to modernize the method of cleaning skate parts. Among the improvements made is the installation of a new type of burnishing barrel, designed by N. Ransohoff, Inc., West 71st St. at Millcreek, Carthage, Cincinnati, Ohio, the design following closely the Ideal Cascade Mill that is widely used in cleaning castings and forgings.

The burnishing compartment is the middle of three sections of the drum,



Ransohoff Burnishing Barrel

the two other sections being storage compartments for the burnishing balls. The start of the operating cycle involves

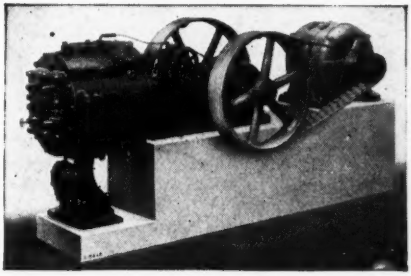
loading the middle section completely with skate parts, so they have no chance to tumble on one another with resultant injury to themselves. The side door is then closed and the barrel operated in burnishing direction. The balls automatically enter the middle compartment and work through and around the parts.

When burnishing is completed, the barrel is rotated in the opposite direction, the balls automatically returning to the end sections. The spent burnishing soap is also run to the ball compartment where it is drained off through valves. A hollow shaft and swivel permit rinsing of balls and work during return of the balls to the ball compartments. The equipment represents an advance in burnishing barrel design because of the total elimination of labor of handling balls and the provision for rinsing work and balls while the balls are returning to the storage compartments.

Worthington Dry Vacuum Pumps

For handling air and vapors not liquified in the condenser, and for pulling a vacuum in any closed system in the chemical process industries, the Worthington Pump and Machinery Corporation, 421 Worthington Ave., Harrison, N. J., has placed on the market a single-stage and a two-stage horizontal dry vacuum pump for which high volumetric efficiencies are said to be obtained.

Minimum clearances, necessary because of the direct relation to volumetric efficiency, are maintained by the design of the close-grained, semi-steel vacuum cylinders. Other features include large cylinder passages and large



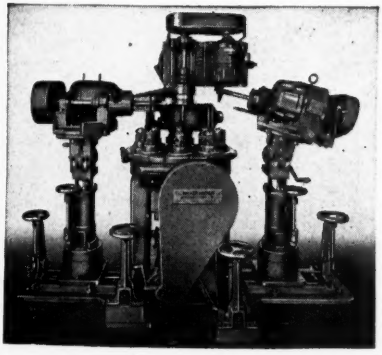
Worthington Dry Vacuum Pump

valve areas which are said to reduce losses, and head and cylinder water jackets are provided with hand holes for easy cleaning.

Each unit is equipped with a patented feather valve. Each valve consists of three parts: the valve strips, seat, and guard. The strips, not held rigidly at any point but restrained from lateral movement by recesses in the curved guard, are the only moving parts. Steel inserts across the ends of the guard milling assure complete freedom of movement for the strips.

The double-row tapered-roller-type main bearings are mounted in assemblies, rigidly bolted to the side of the main frame and held in alignment by centering rings. Provision is made for adjustment. Each unit is equipped with light-weight cast iron pistons, a frame of massive construction, and two counterbalances fitted on an open-hearth steel crankshaft.

The single-stage and two-stage units are built in eight sizes. The single-stage has a piston displacement of 250 to 2,832 cu. ft. per min., and the two-



POLISH BUFF

Automatically

PACKER

Polishing and Buffing Machines

CATALOG GLADLY SENT

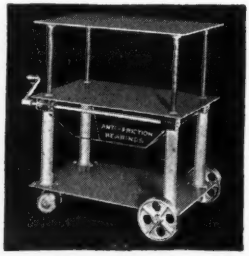
THE PACKER MACHINE CO. MERIDEN, CONN.

stage unit has a displacement of 138 to 1,425 cu. ft. per minute. Single-stage units are employed for a vacuum of 28 in. or less, and two-stage units when a higher vacuum is desired.

Hamilton Portable Elevating Table

The Hamilton Portable Elevating Table shown in the illustration has been brought out by The Hamilton Tool Company, Hamilton, Ohio, to meet the need for a portable device, adjustable for height, which can be used for transporting fixtures, or materials, as an outboard support for extra long work, or as a work table upon occasion.

The feature of the table is the fact that it can be adjusted for height within a given range; thus a die can be

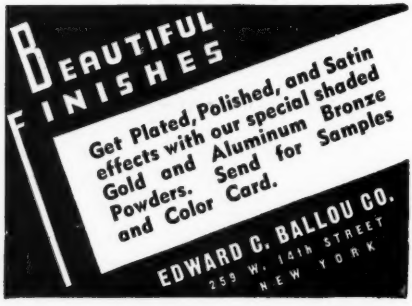


Hamilton Portable Elevating Table

moved directly from the work bench to the table without lifting, lowering, or using a crane.

The table is made in two styles, indicated as "A" and "A-2". The dimension of the Style A table is 21x33 in. The maximum height from the floor is 40 in. and the minimum height, 25 in. Weight, crated, 310 lbs. Carrying capacity, 2,000 lbs. The dimension of the Style A-2 table is 26x38 in. Maximum height from floor, 42 in. Minimum height, 28 in. Weight, crated, 260 lbs. Carrying capacity, 5,000 pounds.

The elevating mechanism consists of four square-thread screws, operating in corresponding nuts which are supported in anti-friction thrust bearings. Power to revolve the nuts is transmitted through gears operated from a shaft that is turned by means of a hand crank. The unit is mounted on anti-friction swivel casters.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259 W. 14th STREET NEW YORK

Brac-Kit First-Aid Kit For Industrial Use

A new type of Brac-Kit, a first-aid kit designed especially for industrial use, has been developed by the Davis Emergency Equipment Company, Graybar Bldg., New York, N. Y.

A special feature of the Brac-Kit is that the kit containing the first-aid supplies is firmly locked, with a dust-proof and water-proof seal, in an outer case, which can be permanently mounted in any convenient location. This permits Brac-Kits to be located at various points in plants, offices, and warehouses, on service trucks and buses, and other places where first-aid may be needed. If an accident happens, no time is lost hunting for first-aid supplies. With a twist of the wrist, the kit is unlocked and withdrawn and its contents are available for instant use. If, after use the kit is mislaid, its absence will be promptly noted.

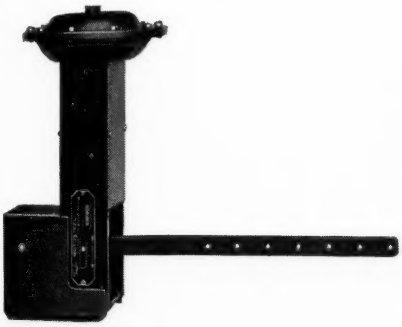
The kit holds ten unit-cartons containing dressings and treatments which can be selected to meet any needs. Provision is made for a wire seal to prevent unauthorized removal of supplies.

Motosteel Evenaction Lever Motor

A pneumatically operated lever motor, to be known as the "Motosteel Evenaction Lever Motor," has been brought out by Taylor Instrument Companies, West Ave. & Ames St., Rochester, N. Y. The unit is of all-steel welded construction. It is equipped with a Motosteel Diaphragm Valve, thus assuring maximum strength, lightness of weight, and permanency of alignment.

Precision operation characteristics are said to insure a uniform relation between the air pressure applied to the diaphragm motor and the resulting lever travel throughout the stroke. A deep diaphragm with large area provides the unit with great power and smoothly modulated action. Ball bearing roller bearings guide the full stroke of the

push rod. The lever is pivoted in phosphor-bronze bushings which are alignment-reamed in the same manner as automobile engine bearings.



Motosteel Evenaction Lever Action

A number of take-off holes are provided throughout the length of the lever so that the force of travel of the motor may be adjusted. The power of either up-stroke or down-stroke can be increased or decreased by a spring adjusting nut. The lever action can be reversed by substituting another lever and transposing the fixed and movable pivots. Limit stops are provided for both up-stroke and down-stroke.

The base is drilled for mounting on floor, wall or ceiling, thus making possible an infiinite number of mounting positions. The unit is said to work equally well in all positions.

Three sizes are available in terms of maximum damper areas which can be accurately positioned, namely 25 sq. ft., 50 sq. ft., and 120 sq. feet. When either a Taylor Valv-Precisor or Dubl-Response Control Unit is operated in conjunction with any of these three motors, the damper areas may be increased appreciably.

The Motosteel Evenaction Lever Motor may be operated by remote manual control, by an electro-pneumatic switch, or by a pneumatically operated controller. It also may be operated in parallel with a diaphragm valve or other pneumatic equipment if desired.

The design and operating features of this motor particularly adapt this lever motor for the operations of dampers, lever operated valves, butterfly

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5) **Ware may be finished in any color desired!**

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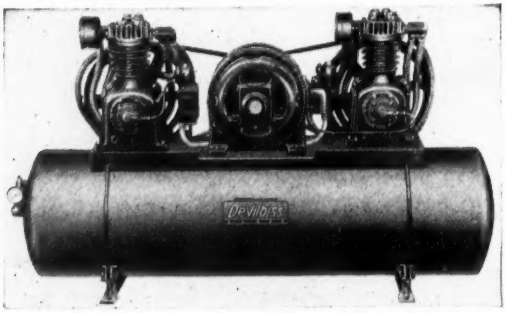
valves, electrical rheostats for variable speed motors, for the control of electrical equipment, or for the operation of any device by the conversion of pneumatic energy to linear or angular mechanical motion.

DeVilbiss Air Compressing Outfits

Four air compressing outfits, supplied in 7½ or 10 h.p. with single or two-stage compressors available with either horsepower, have been placed on the market by The DeVilbiss Company, 300 Phillips Ave., Toledo, Ohio. These compressing outfits are designed especially for large automotive service stations and auto refinishing establishments, whose compressed air requirements are unusually heavy, and for small industrial plants whose compressed air needs are beyond the capacity of the ordinary air-cooled compressor but not equal to the capacity of the industrial type water-cooled air compressing outfit.



DeVilbiss Air Compressing Outfit

Two compressors, each of which develops a maximum pressure of 200 lbs. with the two-stage compressors or 150 lbs. with the single-stage unit, are firmly mounted on opposite ends of the 20x60-in. air tank. The motor which drives both compressors is set between them on the air tank.

Each compressor has a V-belt drive, combination air strainer and muffler, check valve, inter and after cooler, and centrifugal pressure release mechanism set to cut in at 160 lbs. and cut out at 200 lbs. on the two-stage, and in at 80 lbs. and out at 100 lbs. on the single-stage compressor. Displacement of these outfits varies from 31½ to 57 cu. ft. of free air per minute, depending upon pressure and horsepower.

The air tank capacity of both the 7½ and 10 h.p. outfits is 10.88 cu. ft., although a 20x72-in. tank with an air capacity of 13.06 cu. ft. can be supplied if desired. Standard equipment on all outfits includes pressure gage, outlet, drain and safety valves, and automatic starting device.

Neville Nuba Resinous Pitch

A dark thermal-softening plastic, to be known as "Nuba," has been placed on the market by The Neville Company, Neville Island P. O., Pittsburgh, Pa.

Nuba is said to find use in the rubber industry where it may be used as a compounding agent, filler, and softener. Floor tile compounds may be advantageously blended by incorporating Nuba, since it exhibits unusual penetration characteristics and imparts good wear-resisting qualities. When Nuba is used to replace other compounding materials in rubber and floor tile formulation, the use of Nuba of about 15 deg. C. higher melting point than the material it replaces is suggested. It is said to exhibit a tacky quality over a wide range of temperatures and should prove of particular interest to floor tile manufacturers. It is said to resist alkali and soap to a maximum.

Blends of Nuba with paraffin are brown dull-finish waxy materials, homogeneous in nature and varying from soft to hard, depending upon the proportion of the blend. By means of such blends, it is possible to produce a whole range of "waxes," with melting points

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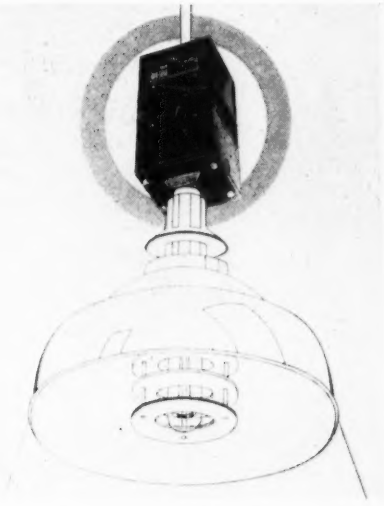
varying as desired between those of paraffin and Nuba.

Nuba's high melting point and binding strength is said to be useful in adhesives and all types of binders.

Nuba is sold in several grades: 30-95 deg. C., 100-125 deg. C., and 135-150 deg. C., melting points. The color is brown to black. Nuba is partially soluble in aromatic solvents. Its outstanding properties are said to be toughness and elasticity. Nuba softens upon being heated and may be blended with numerous other thermoplastic materials, such as waxes, resins, pitches, and so on, by first melting the waxes and then heating the Nuba, followed by mechanical agitation until completely blended.

Acme Mercury Vapor Lamp Transformer

The Acme Electric & Mfg. Co., 1442 Hamilton Ave., Cleveland, Ohio, is now manufacturing a high intensity mercury vapor lamp transformer which, when used with the proper high intensity lamps, is said to provide the maximum of lighting efficiency and of seeing illumination. In order to obtain the high performance and efficiency characteristics necessary for proper operation of this lamp, Acme engineers had to develop an entirely new method of building transformers. As an example, special core manufacturing methods were created which included the use of extremely thin laminations of high silicon steel. This, plus the use of oversize wire for all coils, helped to insure the cool operation of the functioning units. In addition, coils are precision wound, and are of the armored insulation type, which are double impregnated.



Acme Mercury Vapor Lamp Transformer Mounted Pendant

A feature of the Acme high intensity mercury vapor lamp transformer is its universal mounting. Removable mounting legs provide for mounting on either wall, ceiling or pendant. A thread coupling is an integral part of the end plates and is ready for pendant mount-

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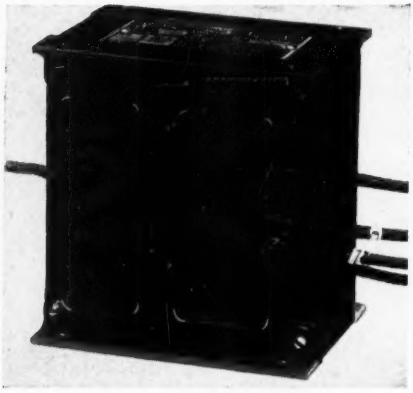


Acme Mercury Vapor Lamp Transformer

ing by simply removing end plate cover.

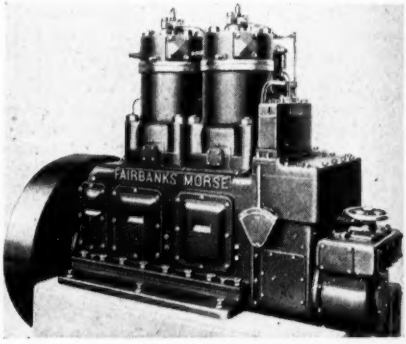
Another important feature of the Acme high intensity mercury vapor lamp transformer consists in its two positive contact universal terminal panels, each mounted in a large compartment with ample space for making connections. All connections to the line or lamp are made at the terminal panels and no joints or taping are required. Connections may be made from either or both ends of the transformer for mercury vapor lamp or mazda or for combination use.

Fairbanks-Morse Heavy Duty Diesel for the Small Power User

A new Fairbanks-Morse Diesel Engine, the Model 42-E, has been developed by Fairbanks, Morse & Co., 910 S. Wabash Ave., Chicago, Ill., to meet the demand of small power users for a heavy-duty, continuous-service stationary engine. It is available in two and three cylinder combinations with ratings of 60 and 90 horsepower at 450 r.p.m., and can be furnished for direct-connected, belt or electric generator drive.

With an 8¾-in. bore and 10½-in. stroke, this Diesel is smaller and lighter than the F-M Model 32-E, but it embodies all of the proven features that have led to the daily use of several hundred thousand horsepower of the larger engines. It is small enough to be installed where space and head room are limited, and it is applicable for any power requirement within its horsepower ratings.

This new model Diesel is characterized by extreme simplicity of design and operation. Two important principles, direct airless injection of fuel and two-cycle design with crankcase scavenging, result in use of an absolute minimum of moving parts. This, along with a medium-low speed, of course means



2-cyl., 8¾-in.x10½-in. F-M Model 42-E Diesel with a rating of 60 h.p. at 450 r.p.m.

greater reliability and lower maintenance cost.

The power impulse on each downward stroke assures a uniform output without need for an abnormally large flywheel. Cylinder heads are simplified by the elimination of air inlet on exhaust valves with their attendant operating mechanism. All working parts are enclosed, yet are readily accessible for inspection and maintenance. The engines are conservatively rated as to capacity, piston speed and bearing pressures, and will operate continuously at rated capacity with no danger of overheating or of strain to any part.

•PLATERS' REMEDIES

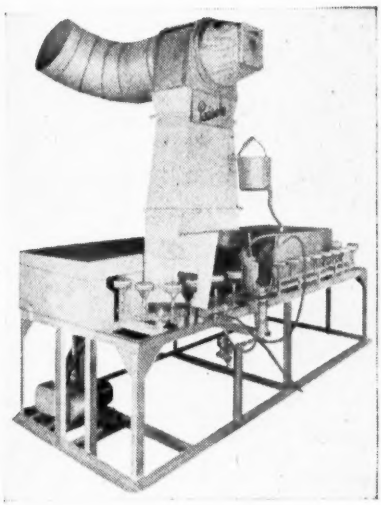
I-Heal-U Ointment, for cyanide sore healing. Chrome Ointment for chromium sore healing. Nickel-Itch Ointment for platers' itch. Prices for any of above 6-3 oz. jars $5.00; each $1.00. Don't wait until you are suffering—order your supply now.

WAMBAUGH CHEMICAL CO.

E. Jackson St. Goshen, Indiana

Paasche Automatic Airbrush

The accompanying illustration shows an automatic unit which was built by Paasche Airbrush Co., Inc., 1910 Diversey Parkway, Chicago, Ill., for a prominent manufacturer of watches and clocks. It consists primarily of a conveyor 10 ft. 3 in. long, 4 ft. 1 in. wide, and 3 ft. 4 in. high equipped with steel roller chain to which are fastened a series of revolving spindles.



Paasche Automatic Airbrush

The unit is designed for coating both round cases and rectangular bases for alarm clocks. The pieces are supported by removable carrying fixture and as each part enters the coating station the Paasche Automatic Airbrushes turn off and on automatically. The pieces next pass into a drying compartment which consists of an oven 10 ft. 5 in. long by 2 ft. 8 in. wide by 1 ft. 5 in. high, insulated with rock wool and equipped with electric strip heaters. Temperatures up to 180 deg. F. are maintained by means of a thermostatic control.

The unit incorporates many patented features that insure maximum savings in labor and material. Golf balls, smoking pipes, radio tubes, lipstick holders, and hundreds of similar items are being coated today by Paasche Automatic Units on a production basis. Heavier objects, such as end brackets and fields for electric motors, flat metal sheets, wallboard, 5 gallon pails and even 55 gallon metal drums can be coated economically by the Automatic Method.

The advantages of automatic aircoating over manual methods are obvious. In this instance, it is 250 per cent faster with more uniform finishes assured.

The pieces are coated and dried in a single handling, thus preventing finger p"nts or blemishes on the freshly lacquered surfaces, reducing rejects to an absolute minimum.

Excelsior No. 27-H Automatic Stainless Steel Sheet Grinding and Polishing Machine

A grinding and polishing machine for polishing large sheets in the rolling mill, to be known as "Excelsior No. 27-H" has been brought out by Excelsior Tool & Machine Co., Ridge Ave., East St. Louis, Ill. The No. 27-H machine is built to use commercial abrasive paper in any width specified for 12 and 16 ft. endless belts. The assembly is sufficiently heavy for continuous production and it is capable of withstanding the power applied to the belt without setting up vibration.

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● Don't discard your worn buffs. Have six of them cut into sectors and mounted on a steel hub. The result is a large size buff which cuts faster, lasts longer and costs less. Send your old 8" or 9" buffs and we will send the complete units back for your own trial.

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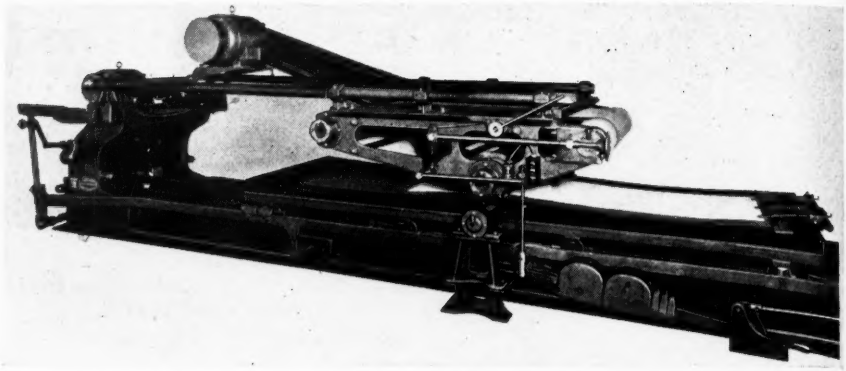

Excelsior No. 27-H Automatic Stainless Steel Sheet Grinding and Polishing Machine

The polishing head consists of 2 steel diametrically balanced pulleys with shafts supported on both sides in dust proof ball bearings, mounted in 2 cast steel machine housings. By means of a centrally located flexible rubber covered pressure roll which applies the pressure to the grinding belt by gravity, any desired amount of pressure can be applied uniformly over the entire width and length of the sheet.

The carriage or table is mechanically operated and adjustable to any length sheet which is passed back and forth under the grinding belt. The grinding head can be raised and the carriage stopped at the extreme forward travel for removal of the finished sheet.

There are no electrical, compressed air or hydraulic appliances used to operate the machine or guide the grinding belt on the pulleys, since the belt remains central after the first adjustment has been made. A 3 h.p. motor is used to operate the carriage and a 40 h.p., 1800 r.p.m. motor with V-belt drive operates the grinding belt.

The machine can be located on any floor and operated under any climatic conditions. Cranes or hoists are not required to remove and replace the grinding belts. Changes can be made in a minimum of time.

Heat reducing application is accentuated by applying a lubricant to the sheet. The entire process is very simple.

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... for Grinding Polishing, Buffing Machines. Fume and Ventilating Systems
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Ballou 450 Mesh Aluminum Powder

A 450 Mesh Aluminum Powder which is said to give a maximum of bulking value and produce a real imitation plated finish after being sprayed has been placed on the market by the Edward C. Ballou Co., 259 West 14th St., New York, N. Y. It is stated by the manufacturer that for spraying purposes only 3½ to 4 ozs. of the aluminum powder to a gallon of bronzing liquid are necessary. The finish obtained closely resembles real plating.

All-Steel-Equip Group Locker

A steel group locker which will accommodate 16 persons in approximately one-half square foot of floor space per person has just been made commercially available by the All-Steel-Equip Company, Aurora, Ill. The new locker is called the A-S-E Unit-Robe. The Unit-Robe is made up of box locker units 12 in. high and 18 in. deep, assembled in two vertical columns of six units each

and connected across the top by a horizontal section of four units. Directly underneath is a coat hanger rod to accommodate the outer garments of 16 or more persons.

The component units, which can be supplied with padlock attachment or with practically any type of flat key or locker combination lock, offer security for clothing, lunches, tools, shoes, hats, wallets, and other personal effects or athletic equipment. The coat rod allows outer garments to hang full length without folding or wrinkling and keeps them exposed to the air at all times.

Following established A-S-E locker design, the frame of the Unit-Robe is strongly constructed of steel channels and ⅛-in. steel angles, riveted together to make the complete section an integral unit, twist- and "weave"- proof. In common with other types of A-S-E lockers, Unit-Robes can be set up in single rows or back to back in double rows, and sections, though complete in themselves, may be "ganged" by bolting together in groups of any number.

Sanitation has been stressed in the Unit-Robe's design. Outer garments may hang free to the movement of air currents. Four standard locker louvers in each door allow ample space for the passage of air into the unit and, where the maximum amount of ventilation is needed and where contents must be available for inspection at all times, grilled steel doors are optional equipment. The bottom of each unit has been made flush with the door frame so that the unit can be thoroughly cleaned. As an inducement to the janitor to keep the front clean, A-S-E standard "torpedo-type" hinges are used on the doors. These hinges, which are practically tamper-proof, have the ends of the pins concealed in smooth embosses on the door front, offering no sharp edges to bark the janitor's knuckles or tear his cleaning cloth. Sweeping or scrubbing the floor under the Unit-Robe is made easy because there are legs under the vertical columns of units only, the rest of the floor space being left free.

All-Steel-Equip Group Locker

Neoprene

This is the name of a handbook which has been brought out by Rubber Chem-

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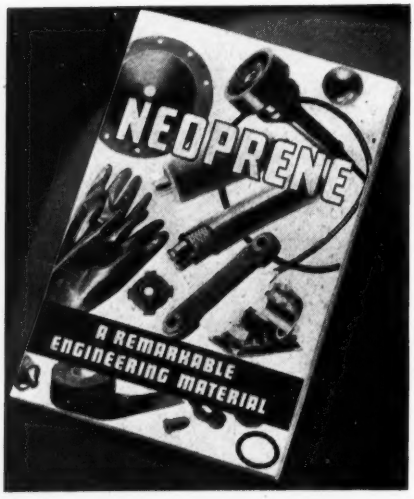

icals Division, E. I. du Pont de Nemours & Company, Inc., Wilmington, Delaware, in which Neoprene, an engineering material with rubber-like properties, yet one which resists the deteriorating effects of oil, heat, sunlight, chemicals, and oxidation, is described in detail. This presentation considers separately the effects of various types of oils, acids, sunlight, heat, and other elements which result in rapid deterioration of rubber products and indicates the type of service which may be expected with a similar part made of Neoprene. Specific applications of Neoprene, including hose, electrical cable, molded parts, extruded materials, sheet goods, and gaskets are also described with data for the use of Neoprene in these applications. Of special interest is a summary of the method of the manufacture of Neoprene and its chemical composition.

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Brown CO_2 Meter Catalog No. 3005. The Brown Instrument Company, Wayne & Roberts Aves., Philadelphia, Pa., has published a new catalog—No. 3005—on Brown CO_2 Meters. The new catalog covers the complete line of Brown Indicating and Recording CO_2 Meters as well as the combined CO_2 and Flue Gas Temperature Recorders. A schematic diagram on pages 12 and 13 illustrates the operating principle of the Brown CO_2 Meter and describes the passage of the flue gas through the various units. Copy of the catalog available to mechanical executives upon request.

Fan Cooled Squirrel-Cage Motors. A publication describing the new line of Type CS Squirrel-Cage Motors has recently been announced by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. These motors employ a new heat exchanger principle of cooling, self-cleaning ball bearings, tested insulation with taped end turns and corrosion resisting construction for general use indoor or outdoor where foreign matter would be harmful to the windings. Copies of the publication are available from the nearest district office or direct from Department 5-N, Westinghouse Electric and Manufacturing Company.

Hamilton Mill Cut Rotary Files are illustrated and described in a folder which is now being distributed by The Hamilton Tool Co., 22 North B Street, Hamilton, Ohio. The folder shows the different types and designs of mill cut rotary files and describes the specific uses and applications of the different kinds of files. The files are made in 22 standard shapes, numbered from 51 to 72. Each shape is obtainable in five standard cuts. Copy of folder free upon request.

Flow Meter Catalog. A new 40-page catalog on Bristol's Electrical and Mechanical Flow Meters is available for distribution by The Bristol Company, Waterbury, Conn. These instruments are for recording integrating, controlling, and indicating the flow of steam, liquids or gases.

"Armco H.T. 50" is the title of a folder published by The American Rolling Mill Company, Middletown, Ohio, in which the properties of the company's high tensile steel are described. A chart shows the comparison of physical properties between Armco H.T. 50 and mild steel. Copy free upon request.

Bulletin No. 6165, issued by Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill., describes the F-M line of duplex, self-oiling pumps for handling mud and slush, clear water, petroleum products and other liquids.

These sturdy pumps are offered as basic units; for belt drive; and with top-mounted or tandem-mounted motors. They are available with capacities from 23 to 94 gallons per minute and with pressures up to 475 lbs. per square inch.

The bulletin, in a sectional view, points out and describes those construction features that contribute to excellent, dependable performance under severe conditions. The different construction features and materials with which these pumps are available make them adapted to many service demands. Copy free upon request.

Syan Blue-B. The first comprehensive laboratory report on the characteristics and applications of Syan Blue B, a product of the first new blue pigment in more than a century, is being distributed by Ault & Wiborg Corporation, 75 Varick St., New York City. Contained in this report are the results of tests and studies carried on for nearly two years in the Research Laboratories of Interchemical Corporation (formerly International Printing Ink), parent company of Ault & Wiborg.

The pigment from which Syan Blue B is derived is the new phthalocyanine compound discovered a few years ago by two Swiss chemists. Research in Germany and in England led to the commercial development of the compound, now hailed as the first new blue since Ultramarine, which was discovered in 1826. The pigment is now being used in the manufacture of industrial finishes, lacquers and enamels, printing inks, and other products. According to Joseph R. Esposito, president of Ault & Wiborg, the unusual qualities of the new finishes make them well adapted to many applications in metal decorating and industrial finishing. It is said to be ideal for automobile finishes where alkali resistance and a non-fading brilliant blue are required.

Tests indicate it to be exceptionally fast to light and heat, to acids, alkalies, and limes. It is insoluble in oil, in spirits, and in nitro-cellulose solvents. Characterized by high tinctorial strength and brilliance of shade, the color of Syan Blue B is said to be well adapted to all types of finishing uses. Its properties of fastness make it particularly well suited to applications which require a color resistant to sunlight, heat and chemical reagents.

The report describes tests made comparing the new pigment with other existing blues—Permanent and Fugitive Peacock, Ultramarine, and Iron Blue. Syan Blue B is shown to be proof to both acids and alkalies, and fast to light and heat.

As a rubber coloring material it has many uses, since the pigment withstands vulcanizing and when used in a finish, it resists wear. Syan finishes are well suited for coloring linoleum and oilcloth, resisting the action of baking and of alkaline agents. The finishes have no harmful effects upon linoleum mix.

The results of "fadeometer" light fastness tests are illustrated graphically in the report, which reproduces samples of four blue colors before and after being subjected to light. Syan Blue B is represented as fading only slightly after 330 fadeometer hours (equivalent to nearly a year of sunlight.)

The cover of the report is printed in Syan Blue B and several samples of the new color are included in the appendix. Copy free upon request.

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